

FIG. 1

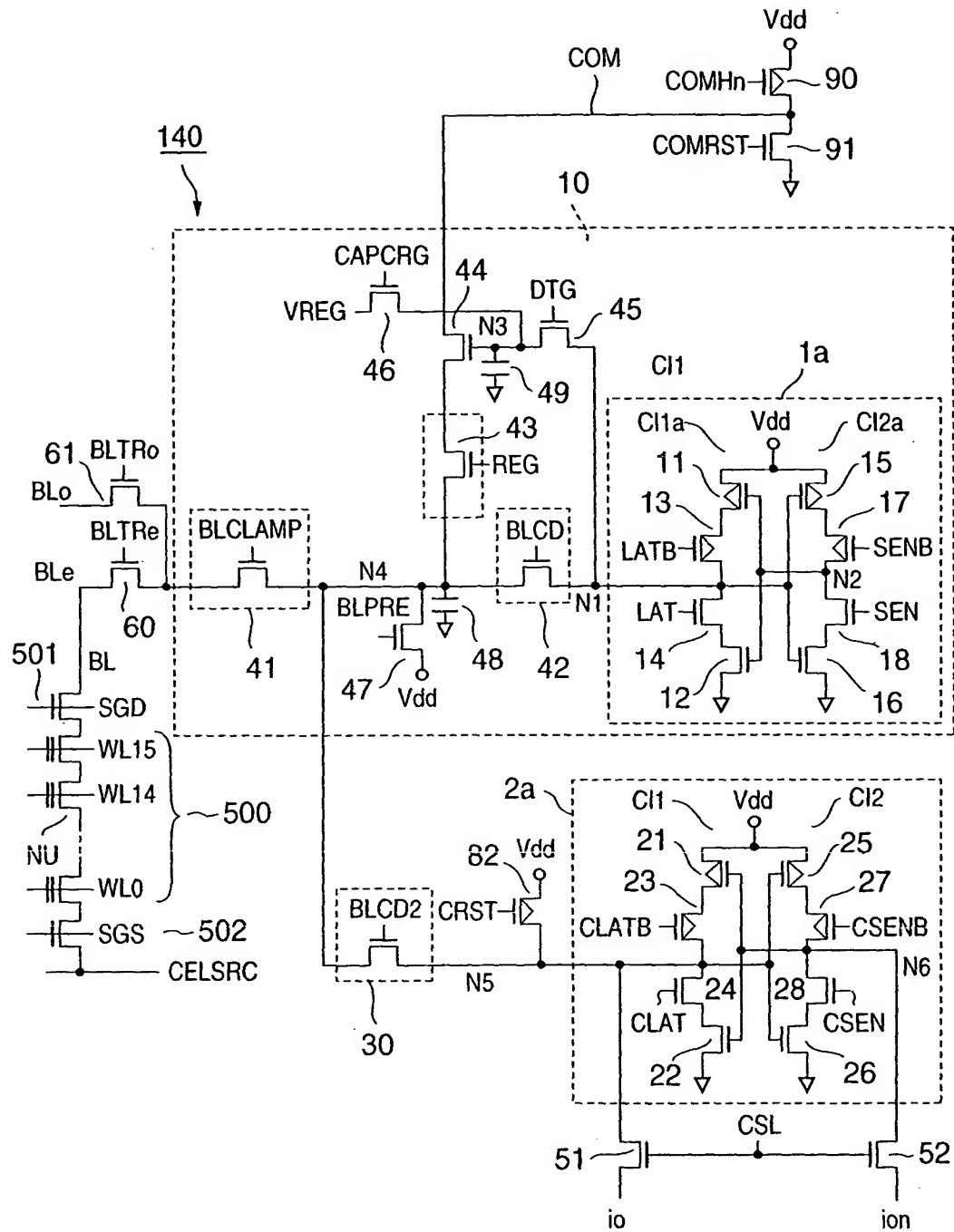


FIG.2

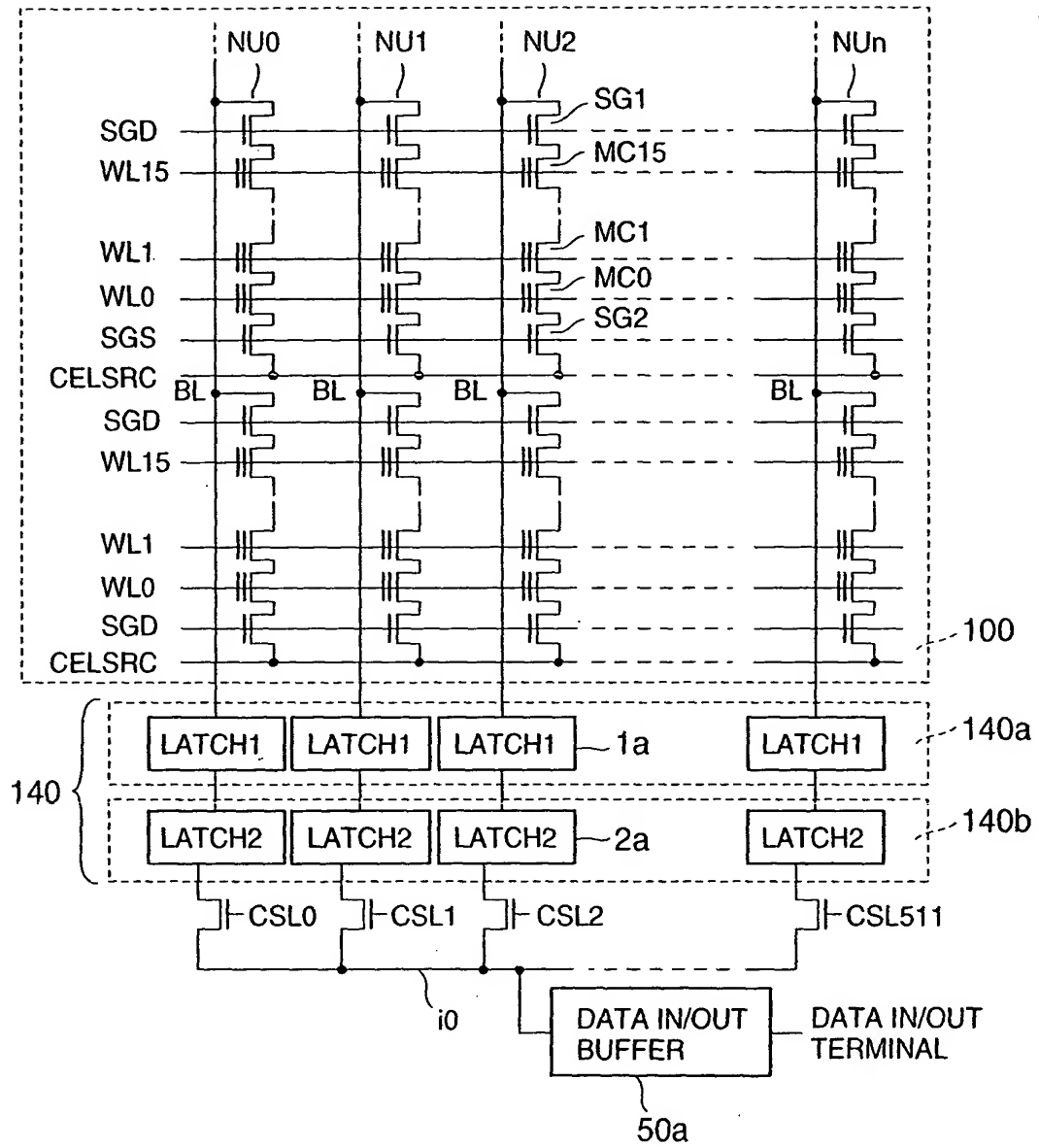


FIG.3

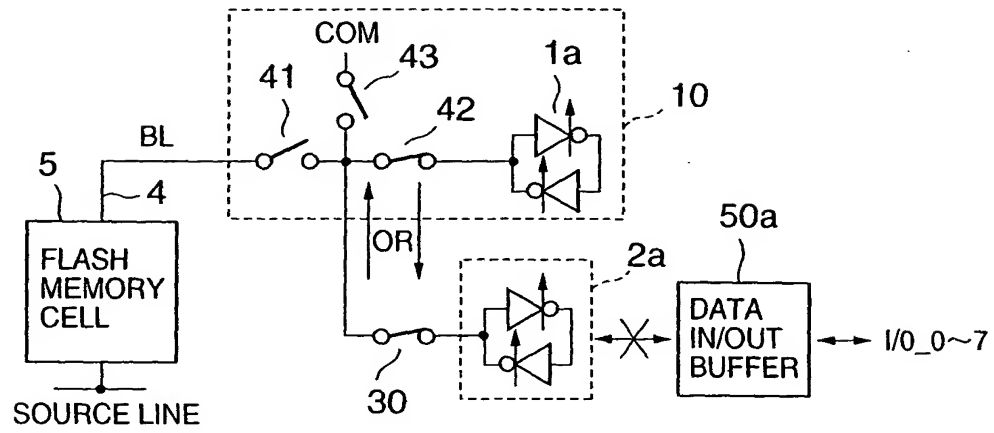


FIG. 4

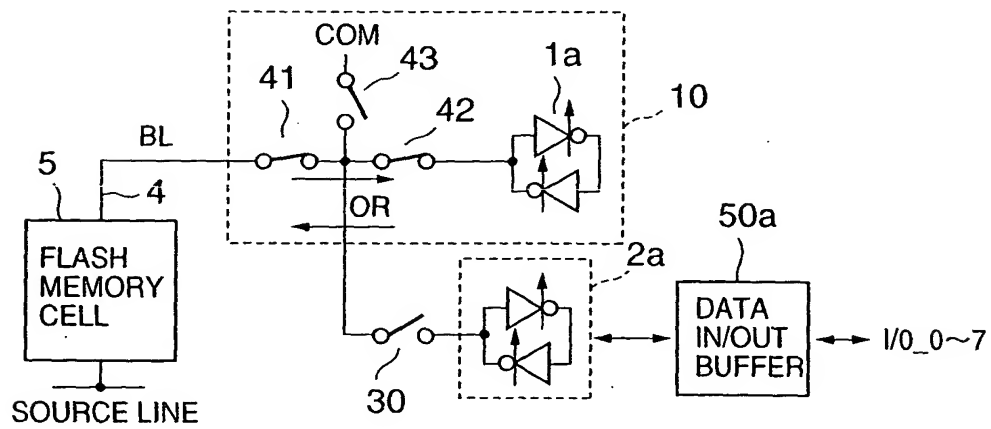
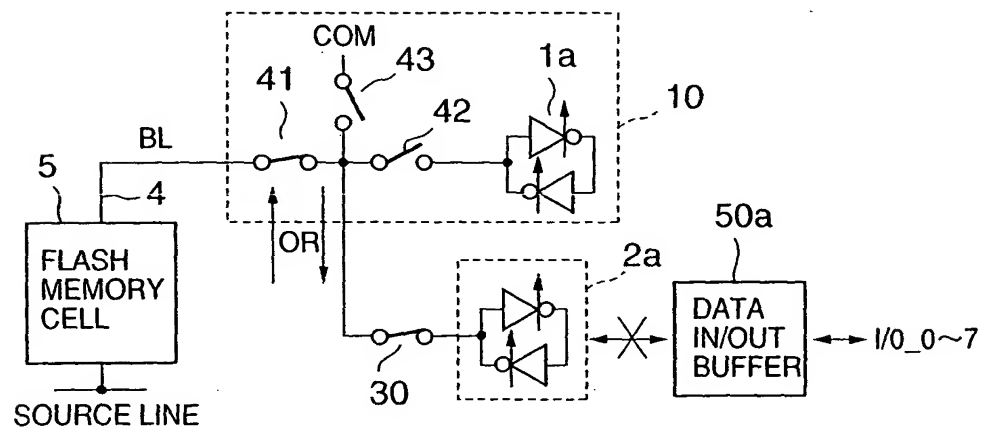


FIG. 5



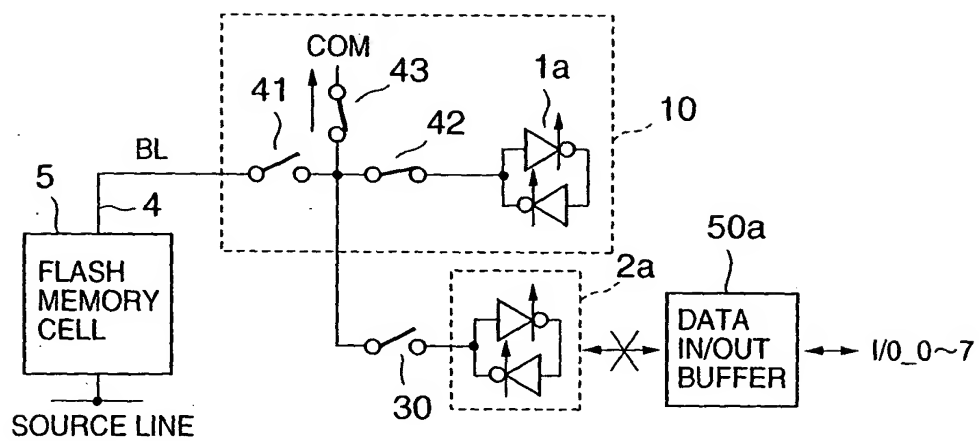


FIG.8

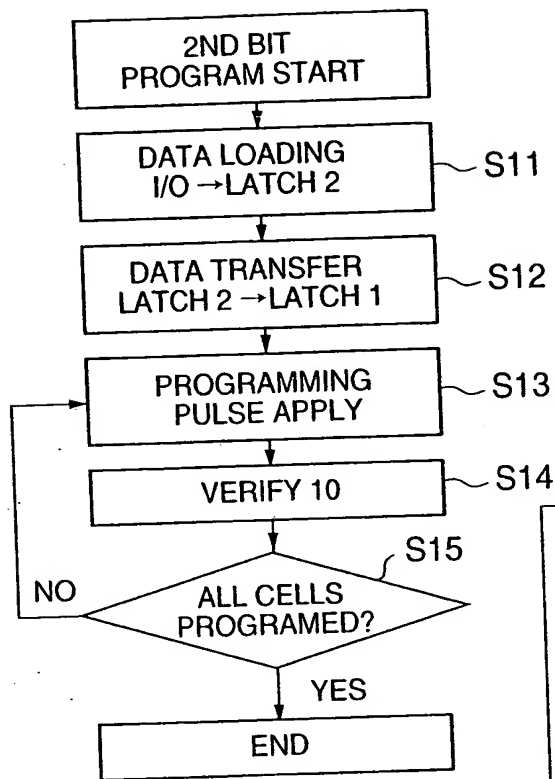


FIG.9A

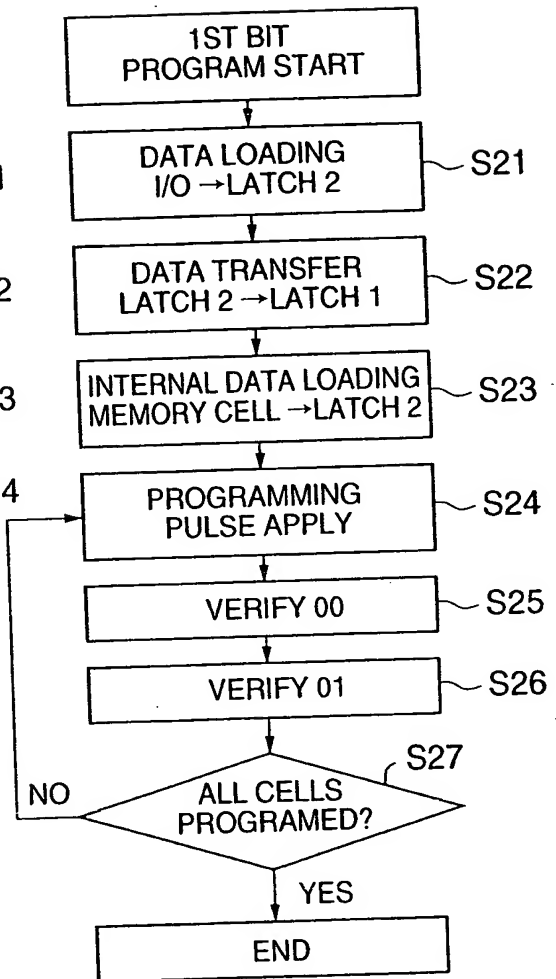


FIG.9B

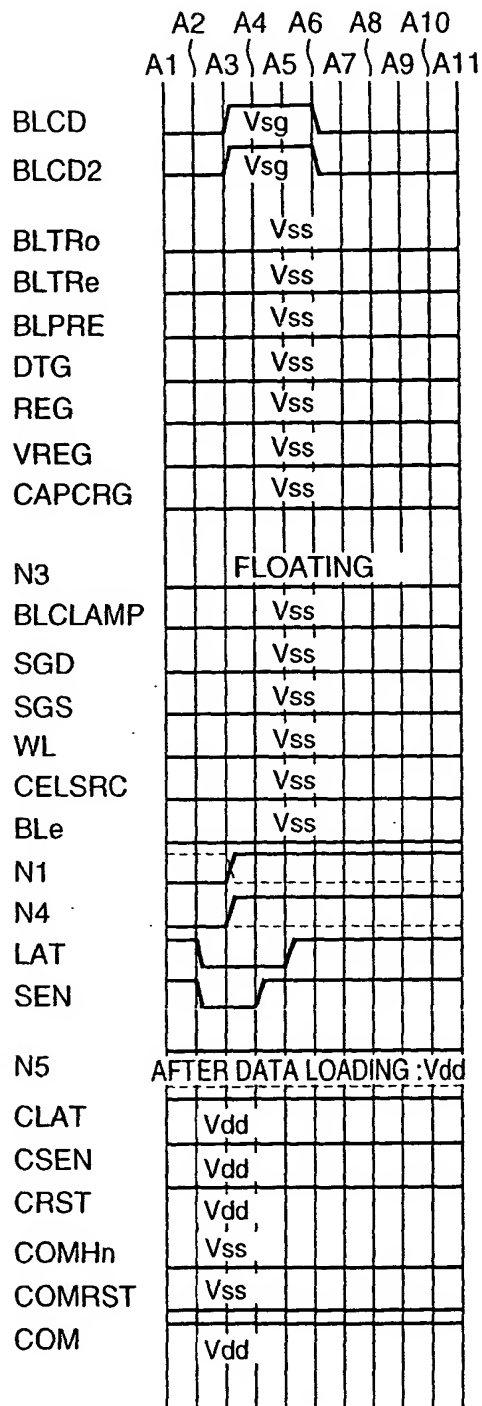


FIG.10A

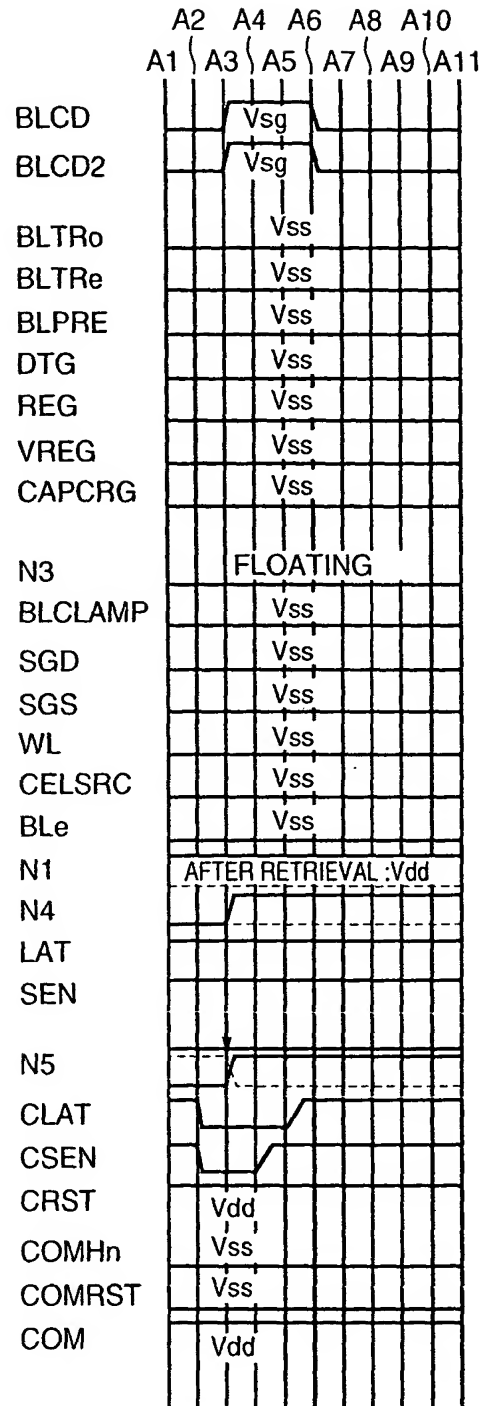


FIG.10B

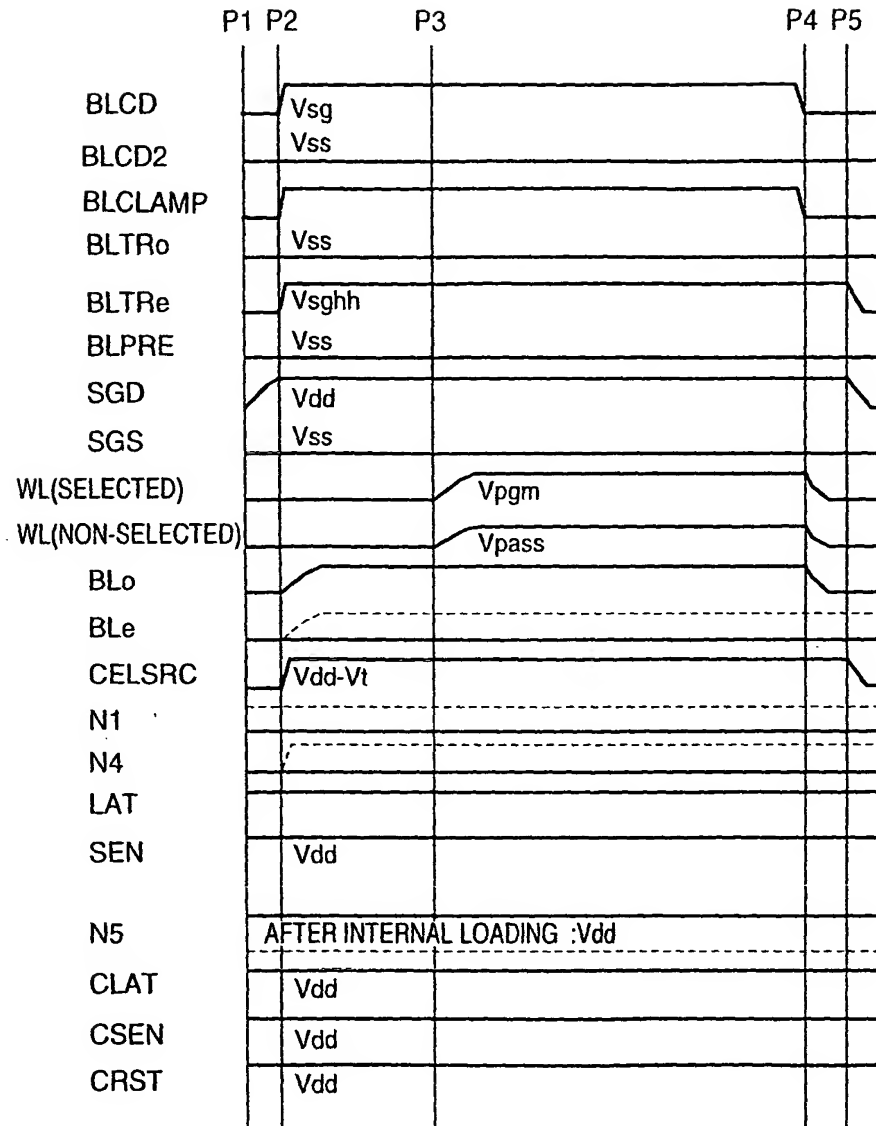


FIG.11

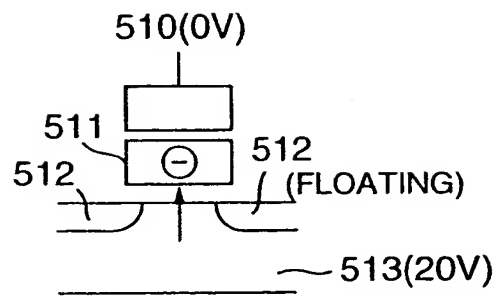


FIG.12A

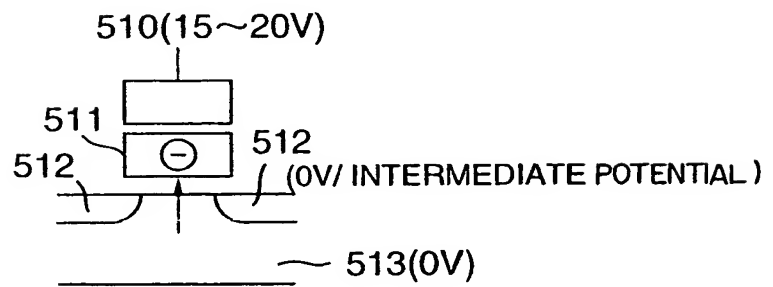


FIG.12B

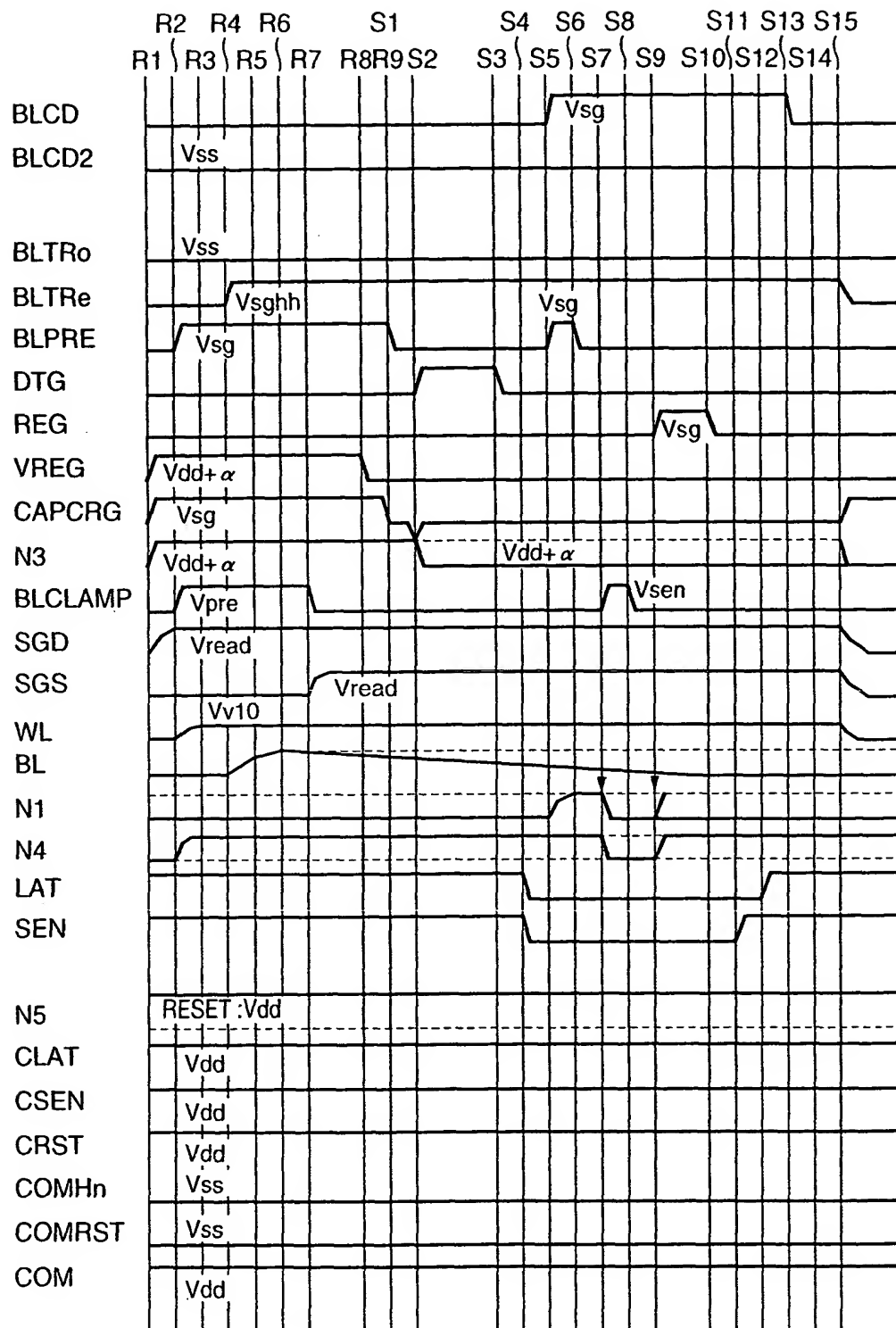


FIG.13

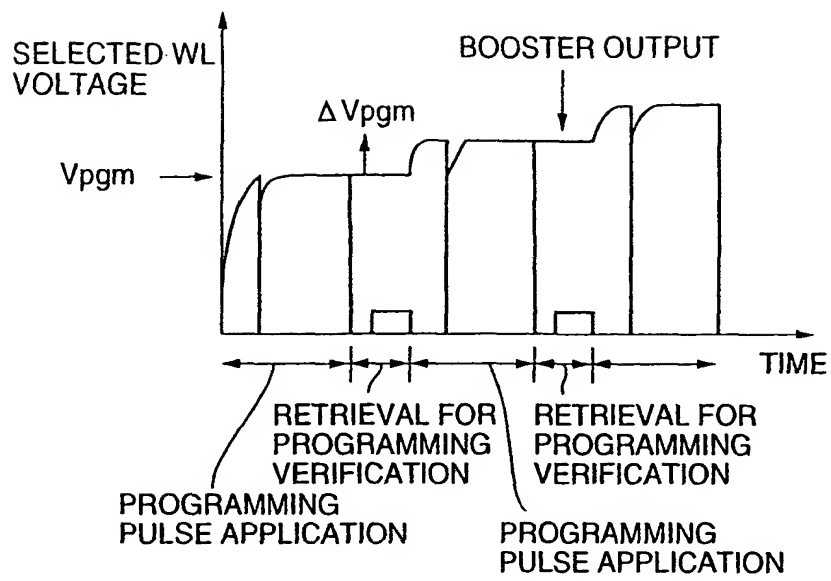


FIG.14

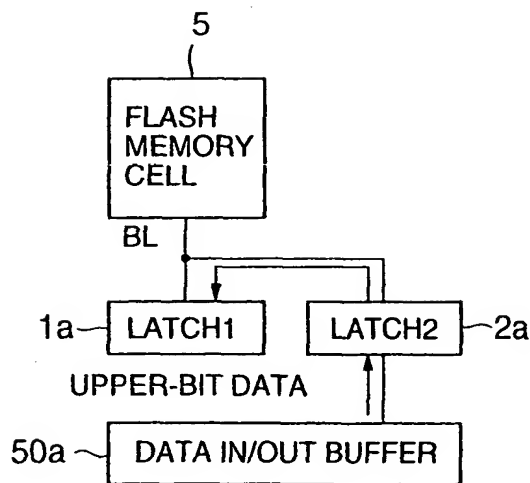


FIG.15A

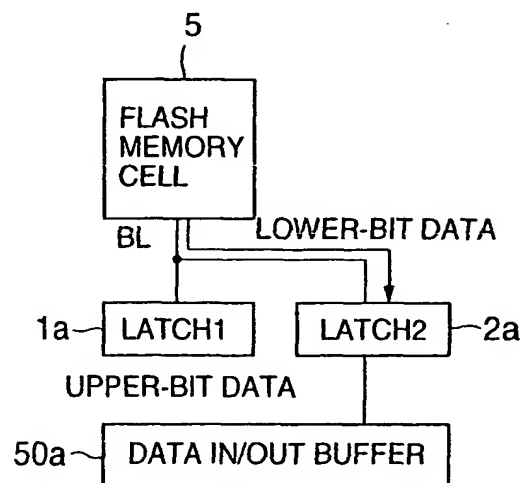


FIG.15B

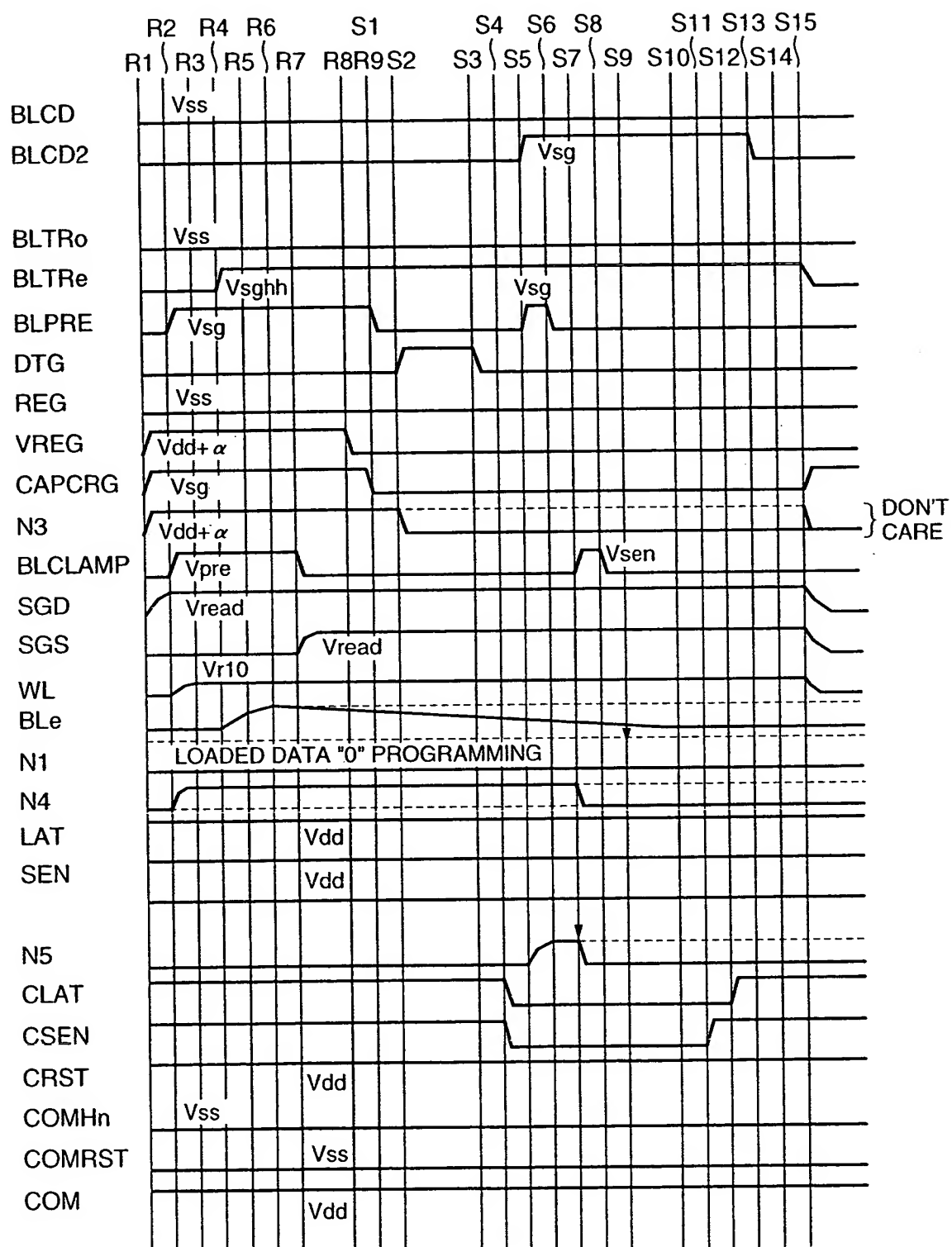


FIG.16

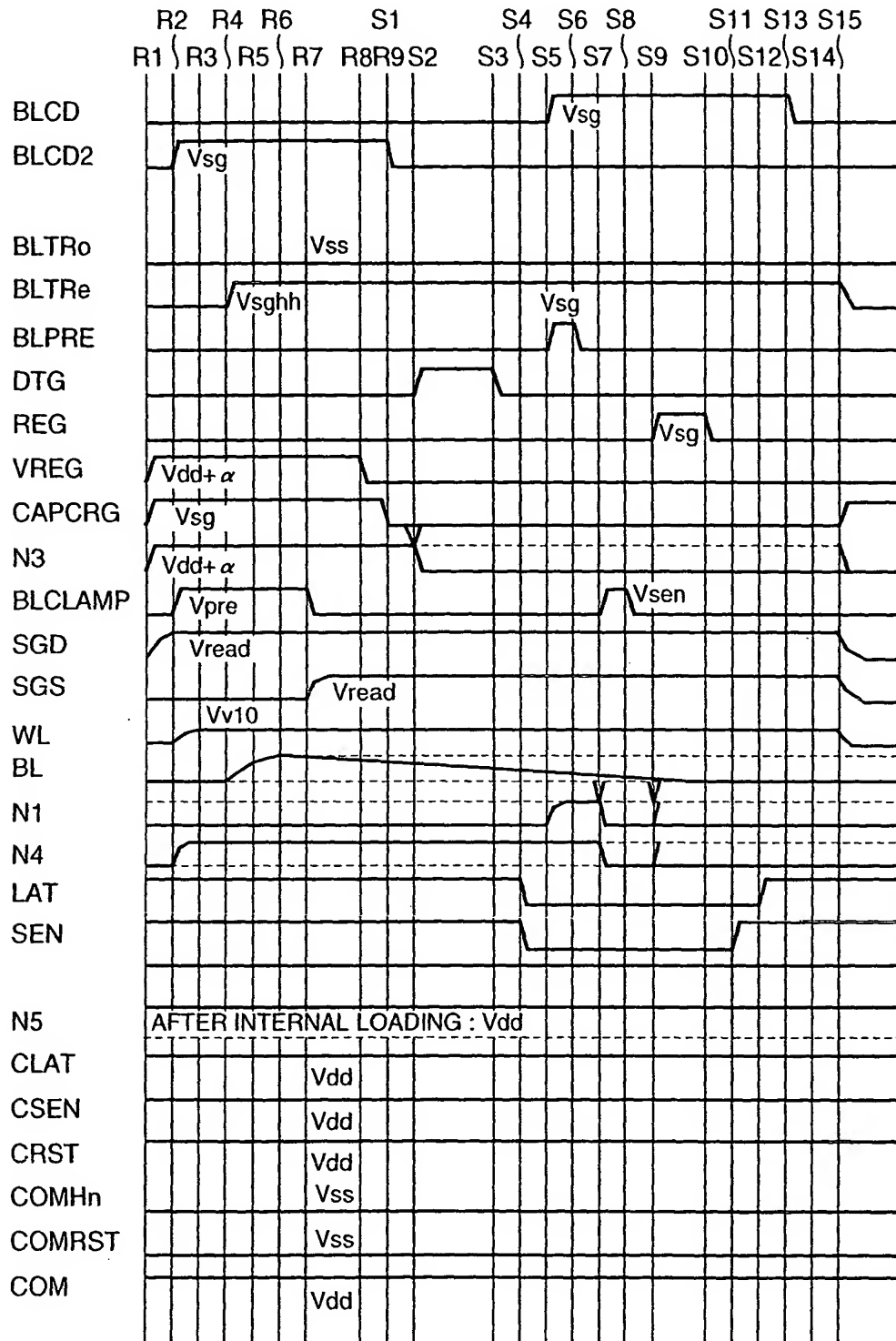


FIG.17

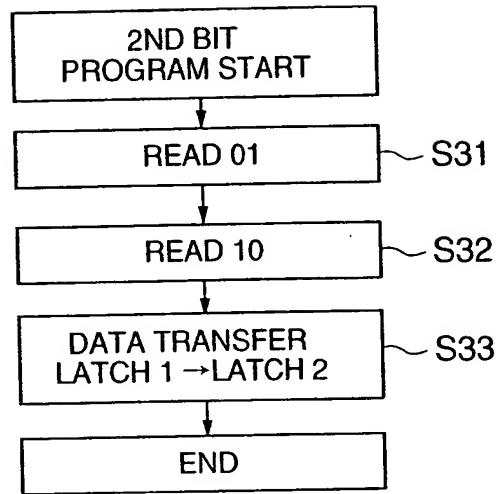


FIG.19A

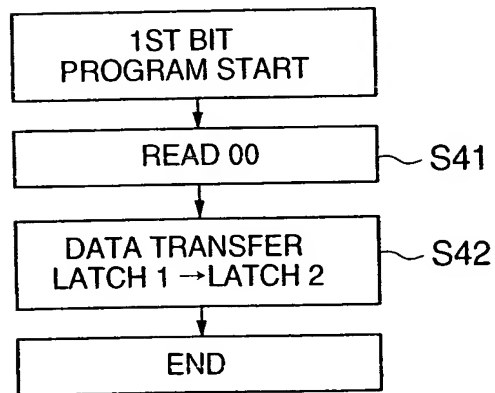


FIG.19B

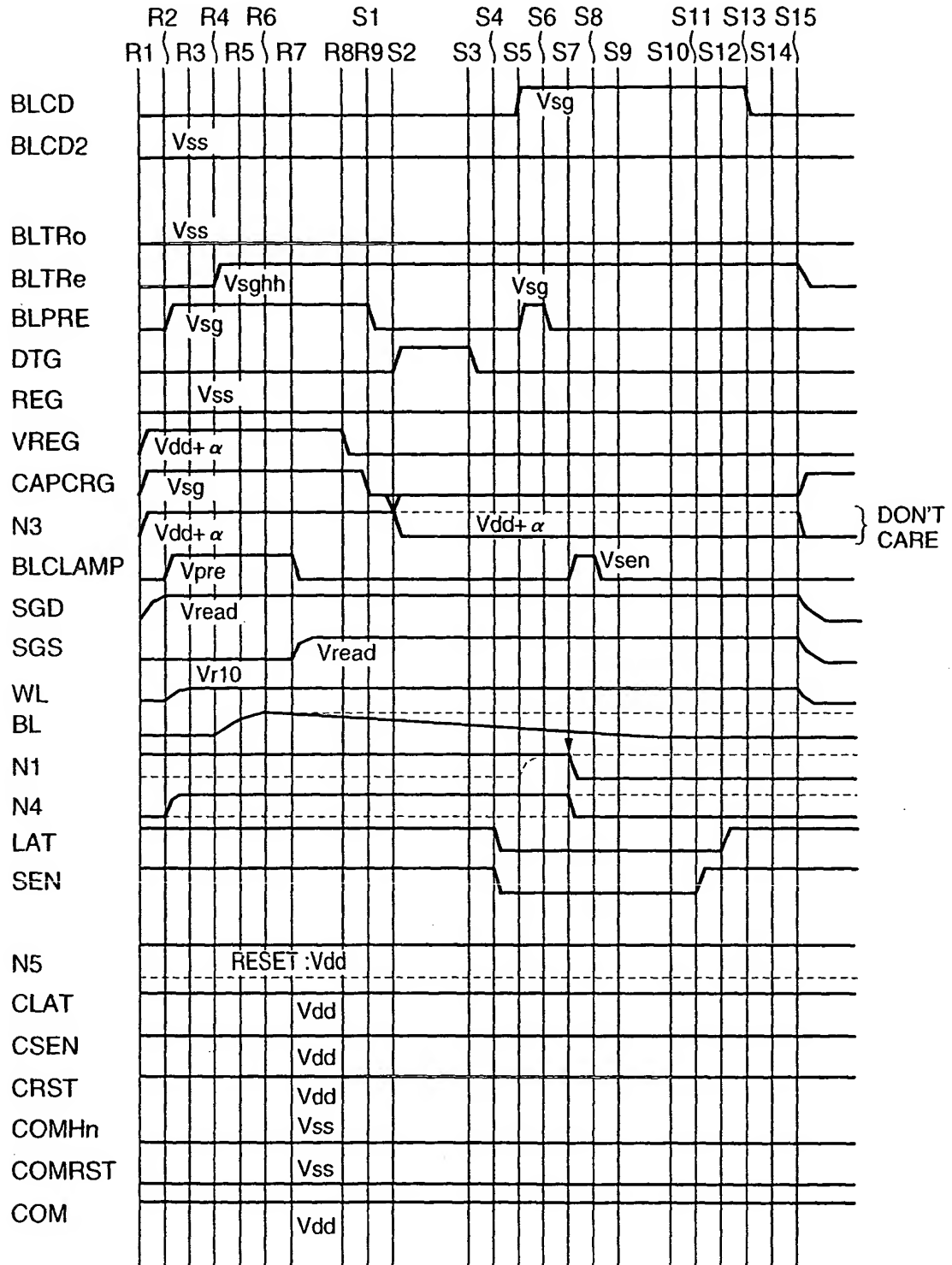


FIG.20

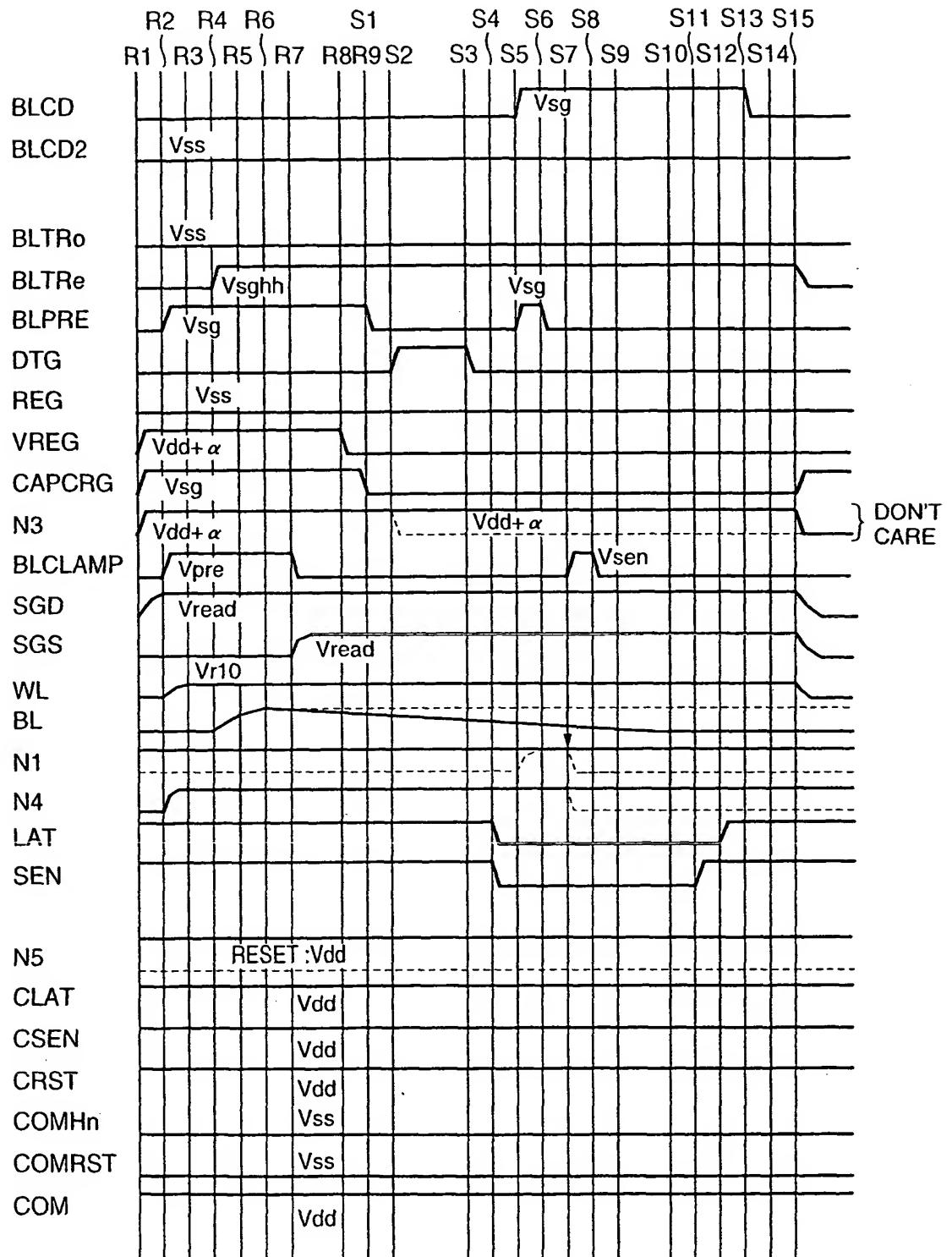


FIG.21

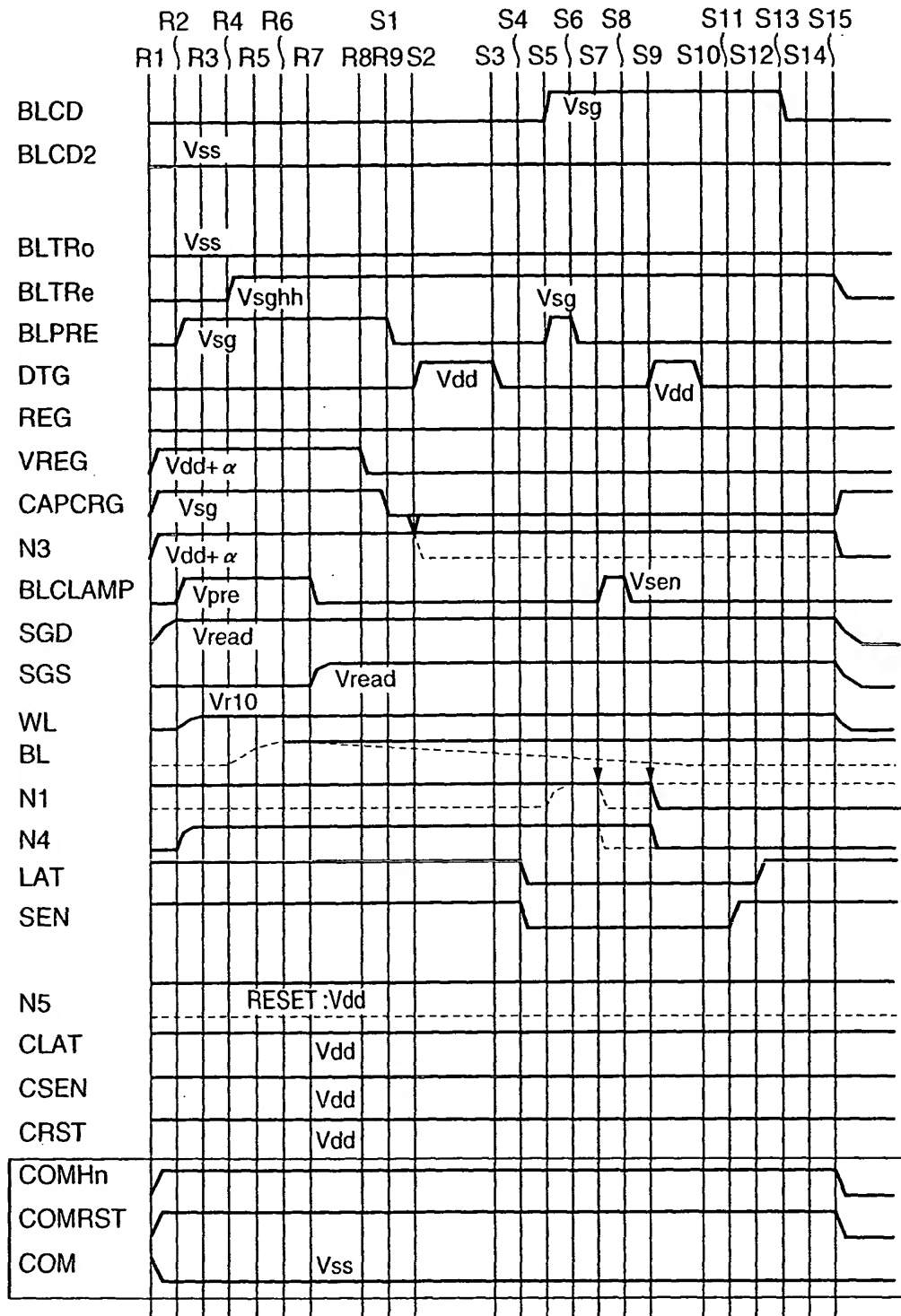


FIG.22

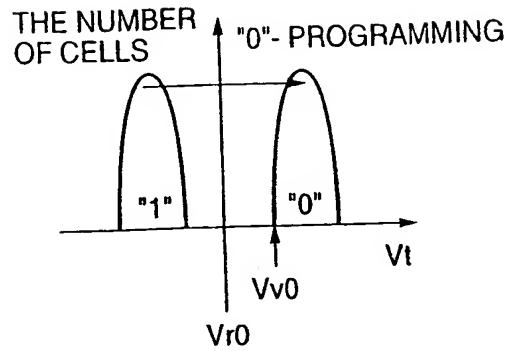


FIG.23

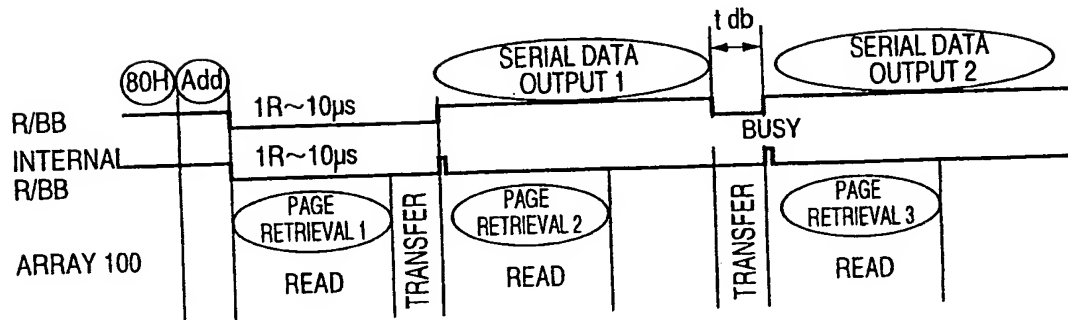


FIG.24A

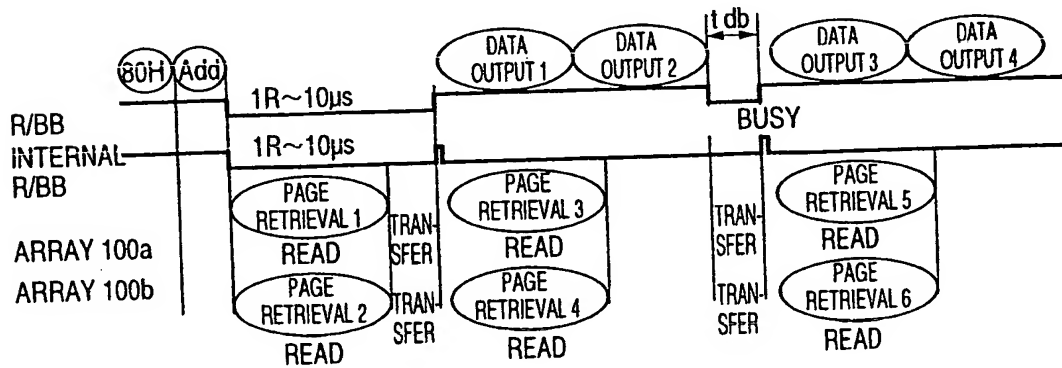


FIG.24B

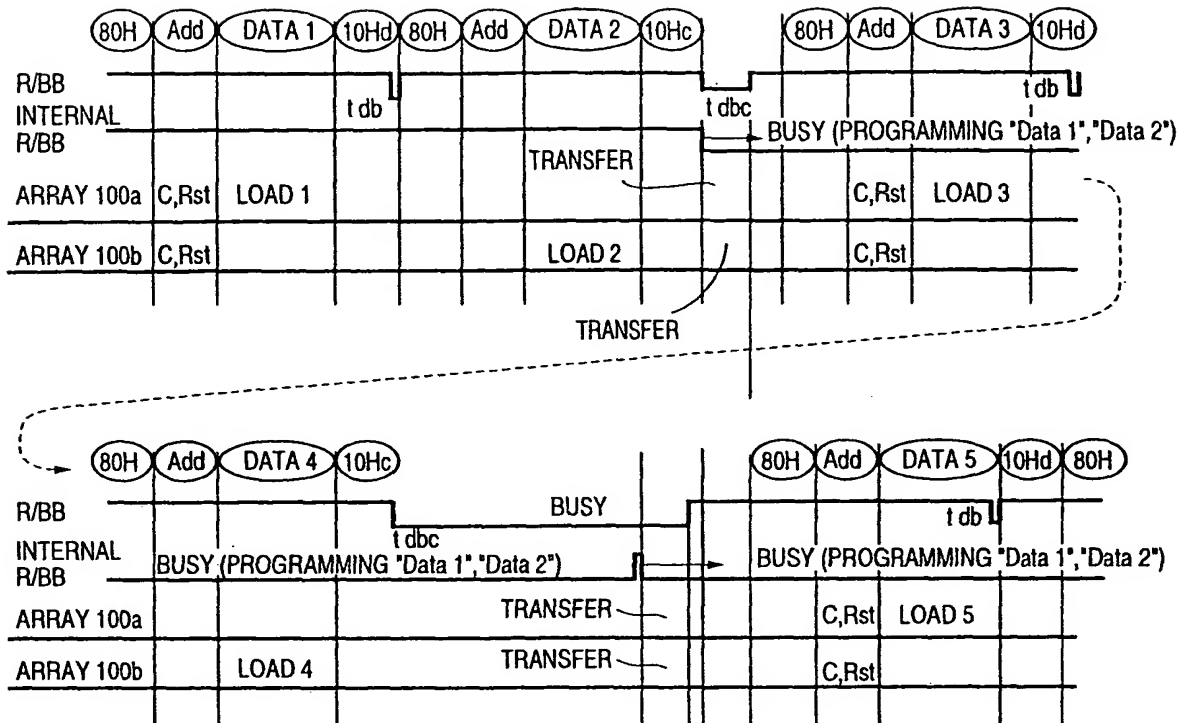


FIG.25A

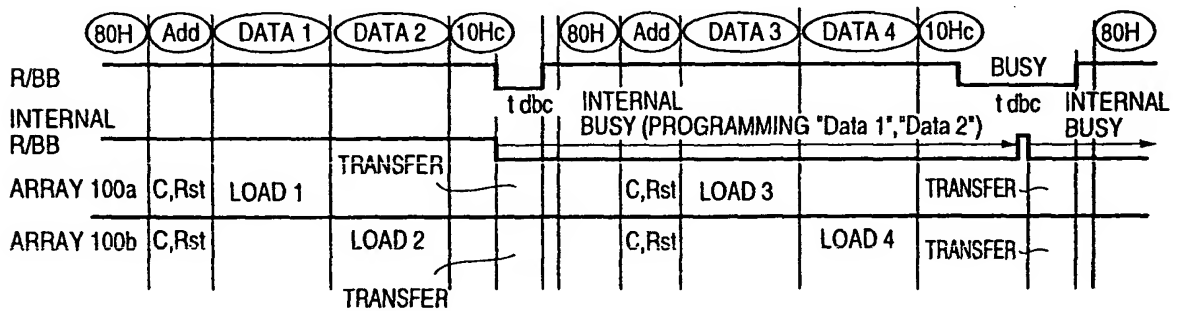


FIG.25B

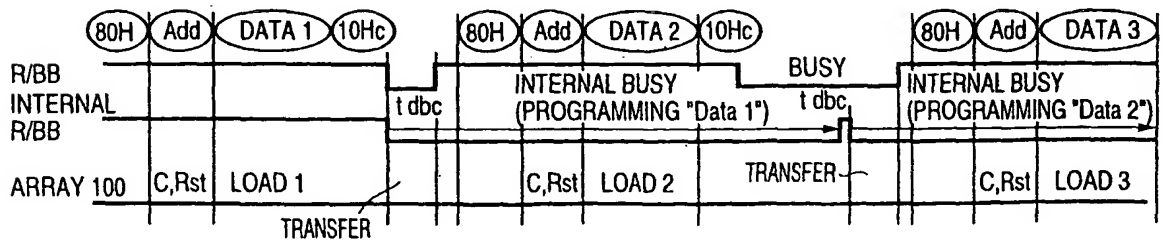


FIG.25C

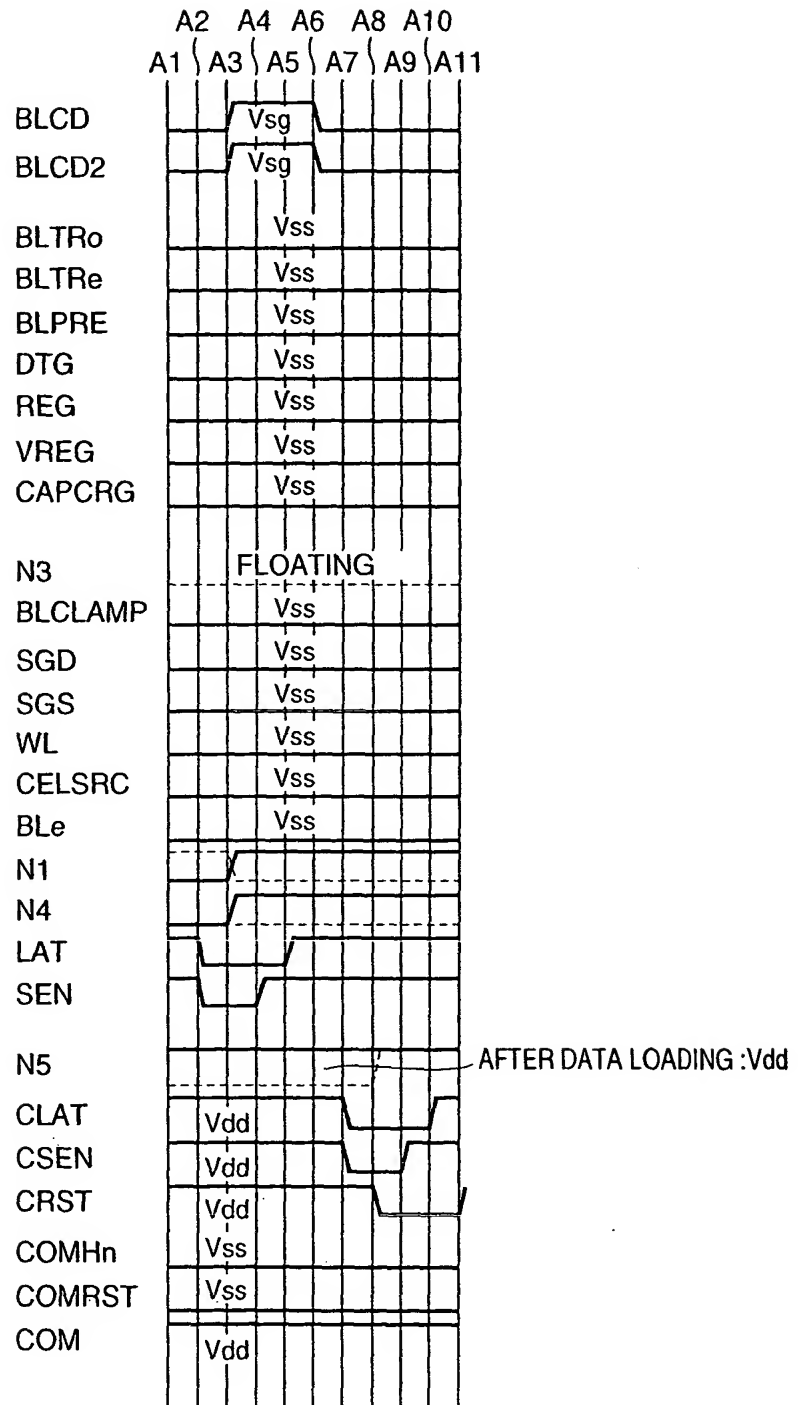


FIG.26

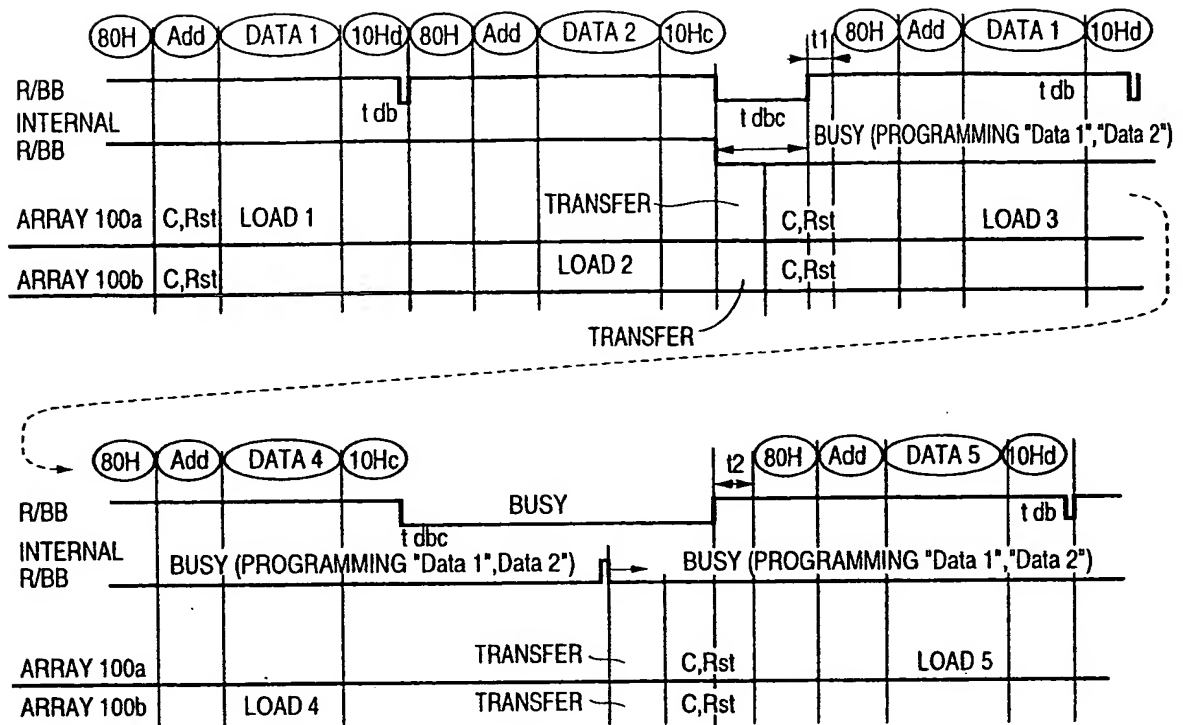


FIG.27

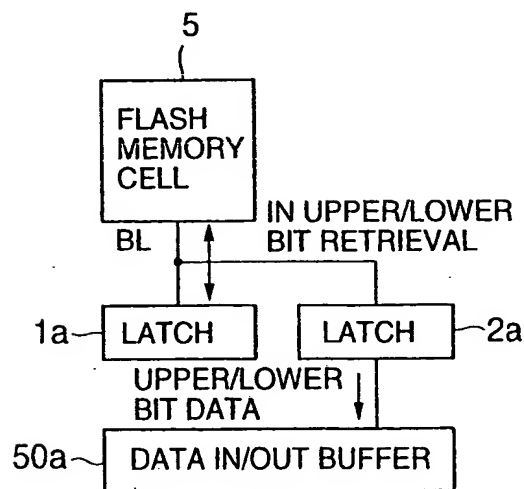


FIG.28A

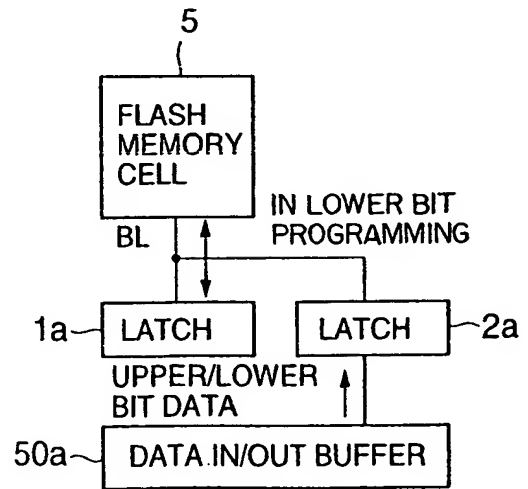


FIG.28B

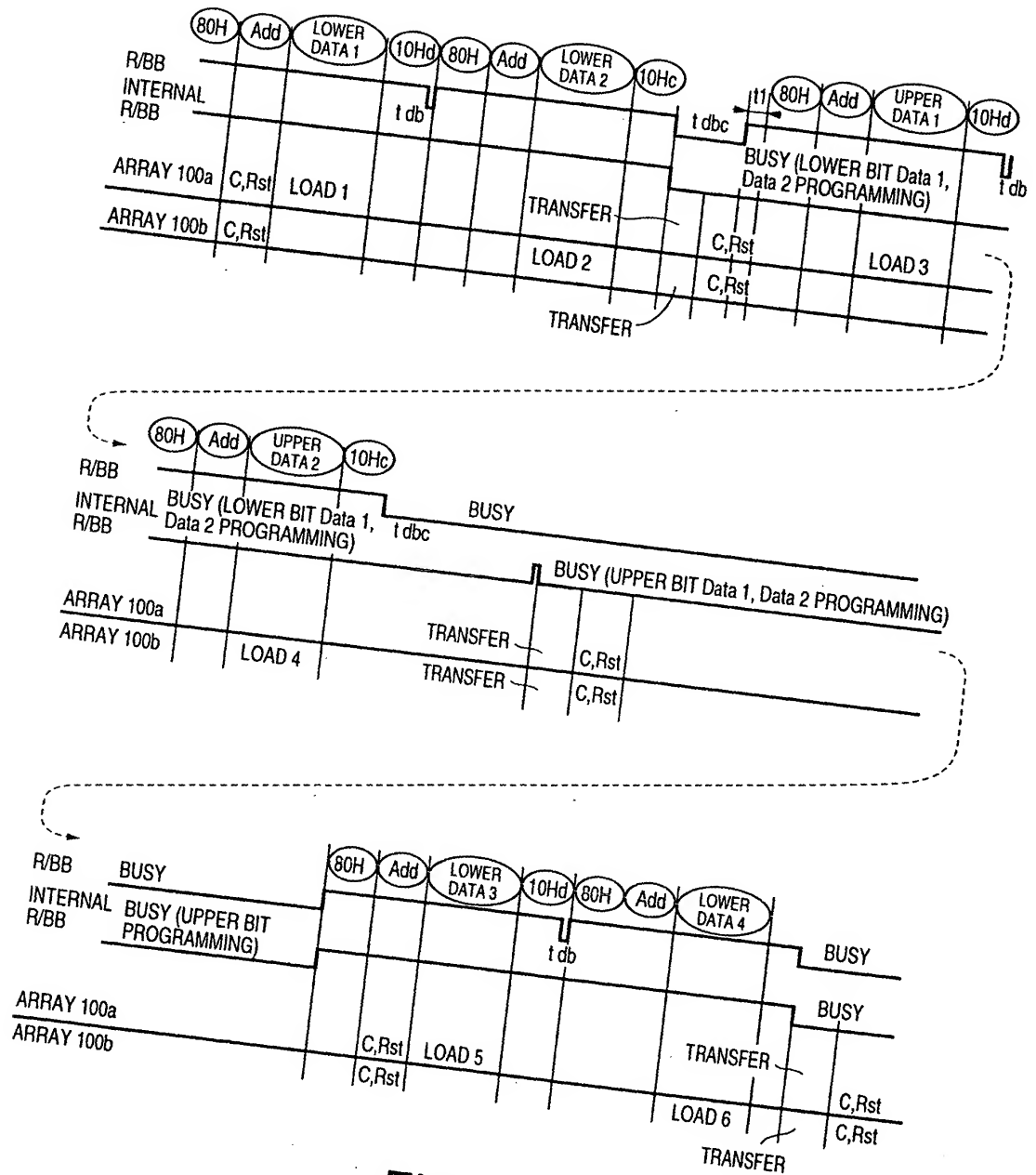


FIG.29

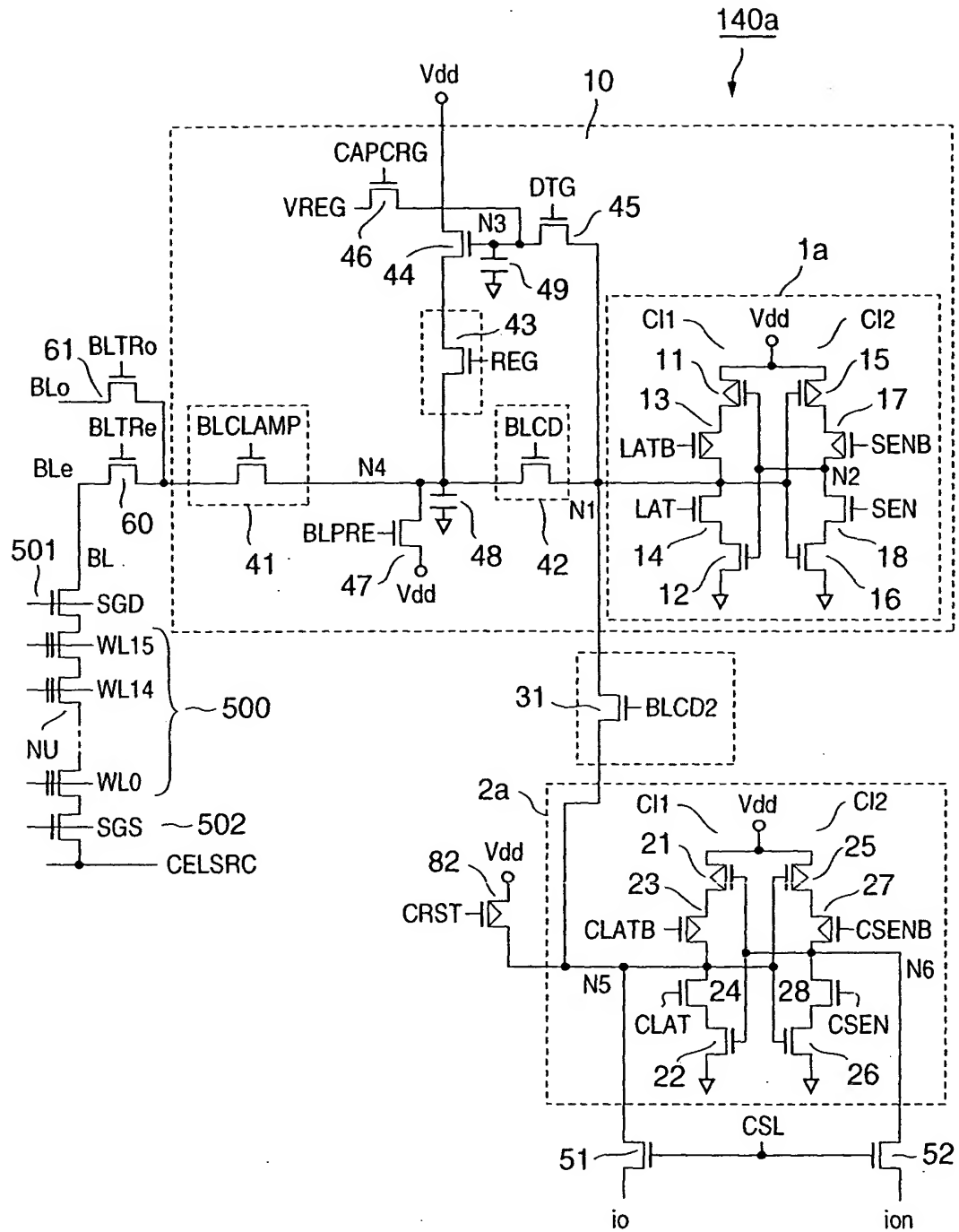


FIG.30

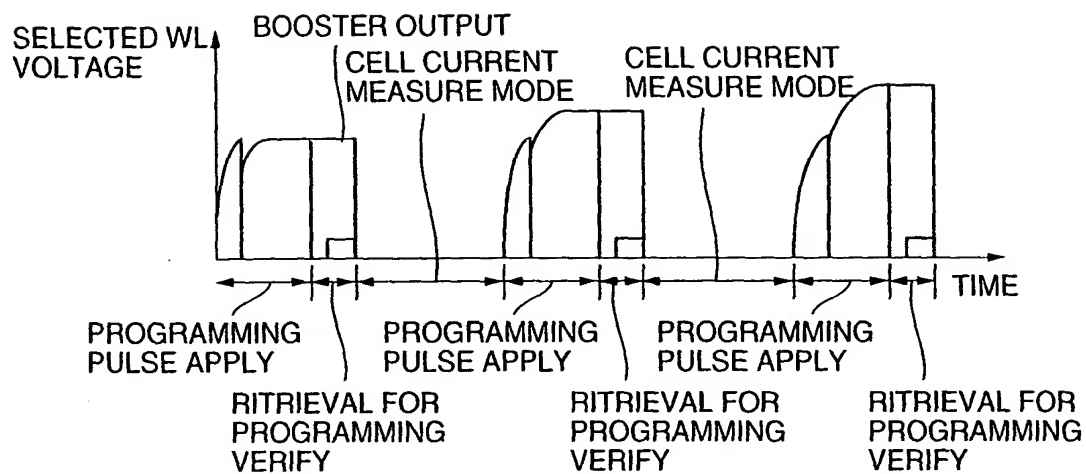


FIG.31A

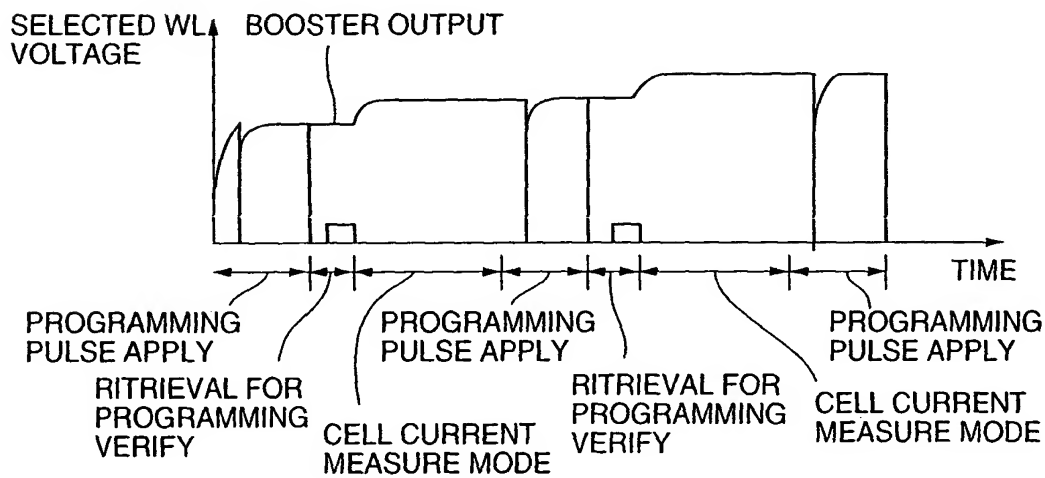


FIG.31B

	BL- POTENTIAL	NODE N1	NODE N3	SELECTED WL
PROGRAM START				
DATA AFTER LOADED	—	L(LOADED DATA)	—	OV
IN PROGRAMMING	L	L	—	Vpgmi
<VERIFY START>				
BL RE- CHARGE BEFORE SENSE	H	L	L(FROM N1)	Vv10
BL POTENTIAL SENSE	L/H	H→L/H	L	Vv10
SENSED NODE RE- CHARGE	L/H	L/H	L	Vv10
DATA STORE	L/H	L(FAIL)/ H(PASS)	L	Vv10

FIG.32

	BL- POTENTIAL	NODE N1	NODE N3	SELECTED WL
PROGRAM START				
AFTER DATA LOADED	—	H(LOADED DATA)	—	OV
IN PROGRAMMING	H	H	—	Vpgmi
<VERIFY START>				
BL PRE- CHARGE BEFORE SENSE	H	H	H(FROM N1)	Vv10
BL POTENTIAL SENSE	L/H	H→L/H	H	Vv10
SENSED NODE RE- CHARGE	L/H	H(FROM N3)	H	Vv10
DATA STORE	L/H	H(PASS)	H	Vv10

FIG.33

	BL- POTENTIAL	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	L (LOADED DATA)	—	L ("11")	OV
IN PROGRAMMING	L	L	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	L (FROM N5)	L	L (FROM N1)	L	Vv00
BL POTENTIAL SENSE	L	H → L	L	L	Vv00
SENSED NODE RE- CHARGE	L	L	L	L	Vv00
DATA STORE	L	L (FAIL)	L	L	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	L	L (FROM N1)	L	Vv01
BL POTENTIAL SENSE	L/H	H → L/H	L (FROM N1)	L	Vv01
SENSED NODE RE- CHARGE	L (FROM N1)	L/H	L	L	Vv01
DATA STORE	L/H	L (FAIL)/ H (PASS)	L	L	Vv01

FIG.34

	LOADED DATA	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	L (LOADED DATA)	—	H ("10")	OV
IN PROGRAMMING	L	L	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	H (FROM N5)	L	L (FROM N1)	H	Vv00
BL POTENTIAL SENSE	L/H	H → L/H	L	H	Vv00
SENSED NODE RE- CHARGE	L/H	L/H	L	H	Vv00
DATA STORE	L/H	L (FAIL) / H (PASS)	L	H	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	※ H	H (FROM N1)	H	Vv01
BL POTENTIAL SENSE	※ L	H → ※ L	※ H	H	Vv01
SENSED NODE RE- CHARGE	※ L	L (FROM N3)	※ H	H	Vv01
DATA STORE	※ L	※ H (PASS)	※ H	H	Vv01

FIG.35

	BL- POTENTIAL	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	H (LOADED DATA)	—	L ("11")	OV
IN PROGRAMMING	H	H	—	—	Vpgmi
<VERIFY "00" START>					
BL PRE- CHARGE BEFORE SENSE	L (FROM N5)	H	H (FROM N1)	L	Vv00
BL POTENTIAL SENSE	L	H → L	H	L	Vv00
SENSED NODE RE- CHARGE	L	H (FROM N3)	H	L	Vv00
DATA STORE	L	H (PASS)	H	L	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	H	H (FROM N1)	L	Vv01
BL POTENTIAL SENSE	L	H → L/H	H	L	Vv01
SENSED NODE RE- CHARGE	L	H (FROM N3)	H	L	Vv01
DATA STORE	L	H (PASS)	H	L	Vv01

FIG.36

	LOADED DATA	NODE N1	N3	N5	SELECTED WL
<PROGRAM START>					
AFTER DATA LOADED	—	H (LOADED DATA)	—	H ("10")	OV
IN PROGRAMMING	H	H	—	—	Vpgmi
<VERIFY START>					
BL PRE- CHARGE BEFORE SENSE	H (FROM N5)	H	H (FROM N1)	H	Vv00
BL POTENTIAL SENSE	L	H → L	H	H	Vv00
SENSED NODE RE- CHARGE	L	H (FROM N3)	H	H	Vv00
DATA STORE	L	H (PASS)	H	H	Vv00
<VERIFY "01" START>					
BL PRE- CHARGE BEFORE SENSE	H	H	H (FROM N1)	H	Vv01
BL POTENTIAL SENSE	L	H → L	H	H	Vv01
SENSED NODE RE- CHARGE	L	H (FROM N3)	H	H	Vv01
DATA STORE	L	H (PASS)	H	H	Vv01

FIG.37

	BL- POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "00" START				
BL PRE- CHARGE BEFORE SENSING	H	H	—	Vr 00
BL POTENTIAL SENSING	L/H	H → L/H	—	Vr 00
DATA STORE	L/H	L ("1") / H ("0")	—	Vr 00

FIG.38

	BL- POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	H	—	Vr 01
BL POTENTIAL SENSING	L/H	H → L/H	—	Vr 01
DATA STORE	L/H	L/H	—	Vr 01

FIG.39

	BL- POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	H	H (FROM N1)	Vr 10
BL POTENTIAL SENSING	H	H → H	H	Vr 10
SENSED NODE RE- CHARGE	H	L (FROM N3)	H	Vr 10
DATA STORE	H	L ("1")	H	Vr 10

FIG.40

	BL- POTENTIAL	NODE N1	N3	SELECTED WL
RETRIEVAL "01" START				
BL PRE- CHARGE BEFORE SENSING	H	L	L (FROM N1)	Vr 10
BL POTENTIAL SENSING	L/H	H → L/H	L	Vr 10
SENSED NODE RE- CHARGE	L/H	L/H	L	Vr 10
DATA STORE	L/H	L ("1") / H ("0")	L	Vr 10

FIG.41

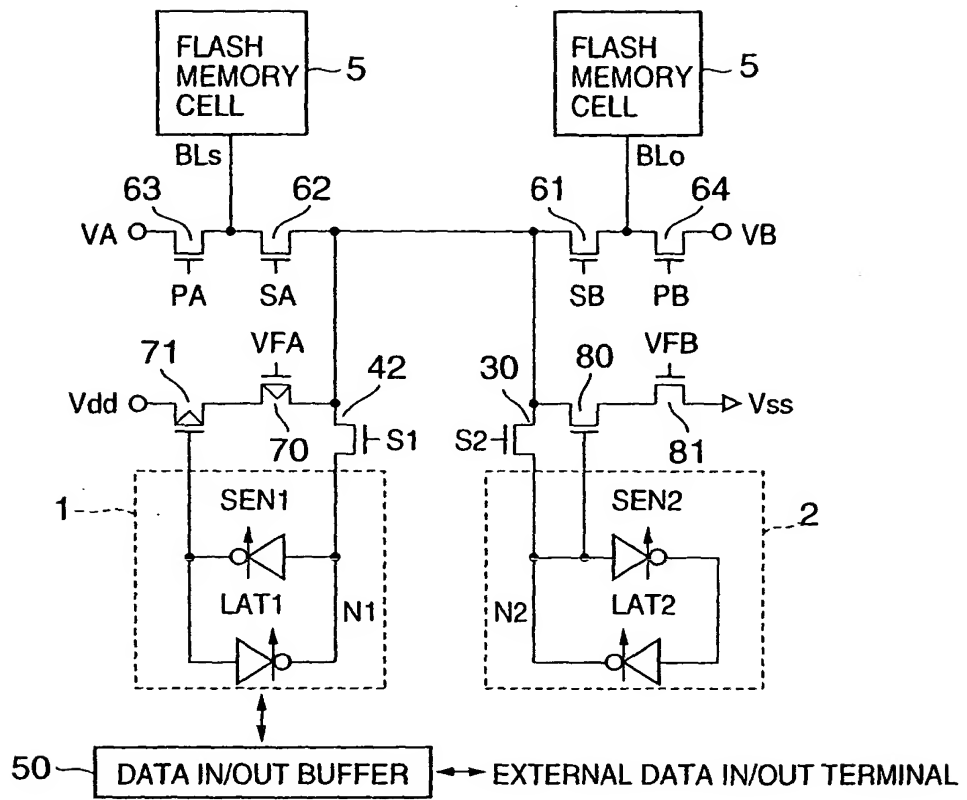


FIG.42 (RELATED ART)

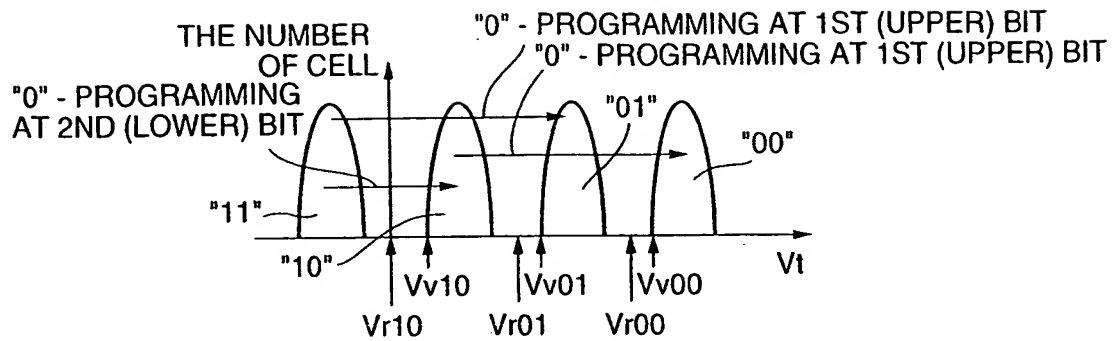


FIG. 43A

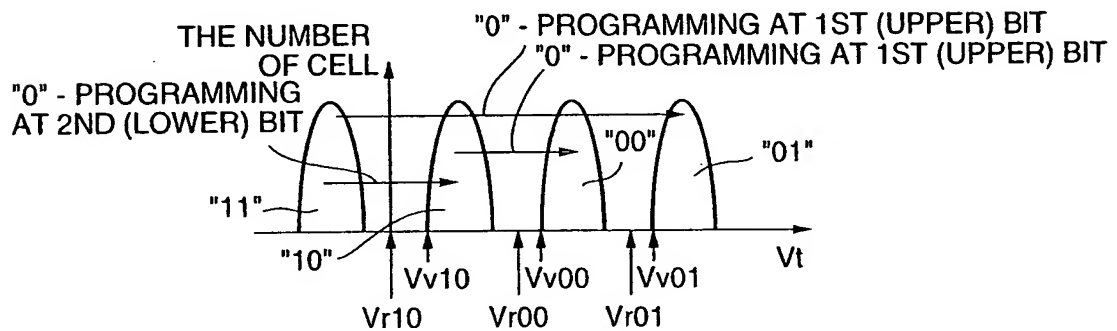


FIG. 43B

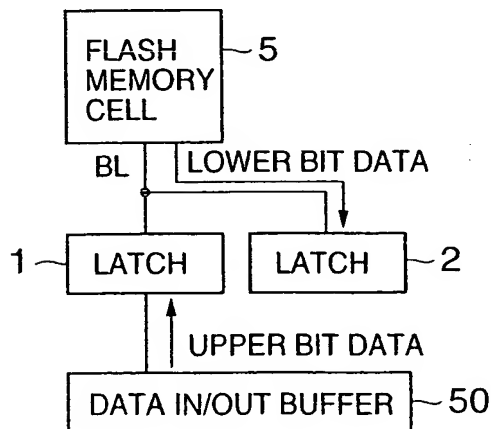


FIG. 44 (RELATED ART)

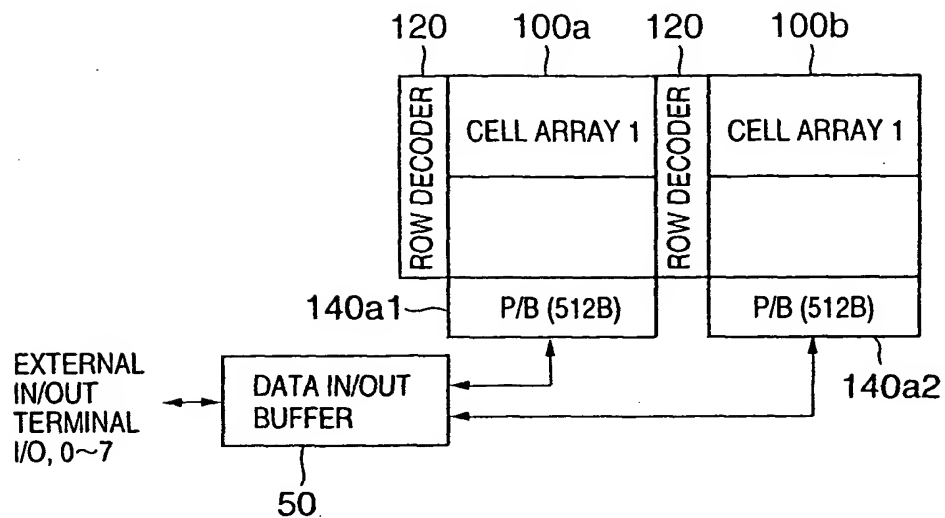


FIG. 45A (RELATED ART)

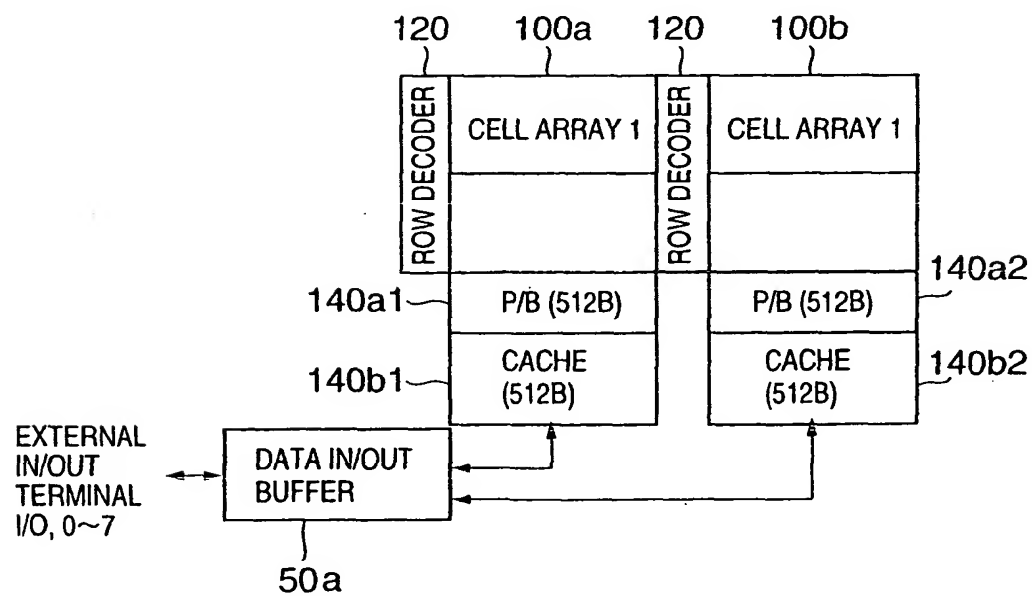


FIG. 45B

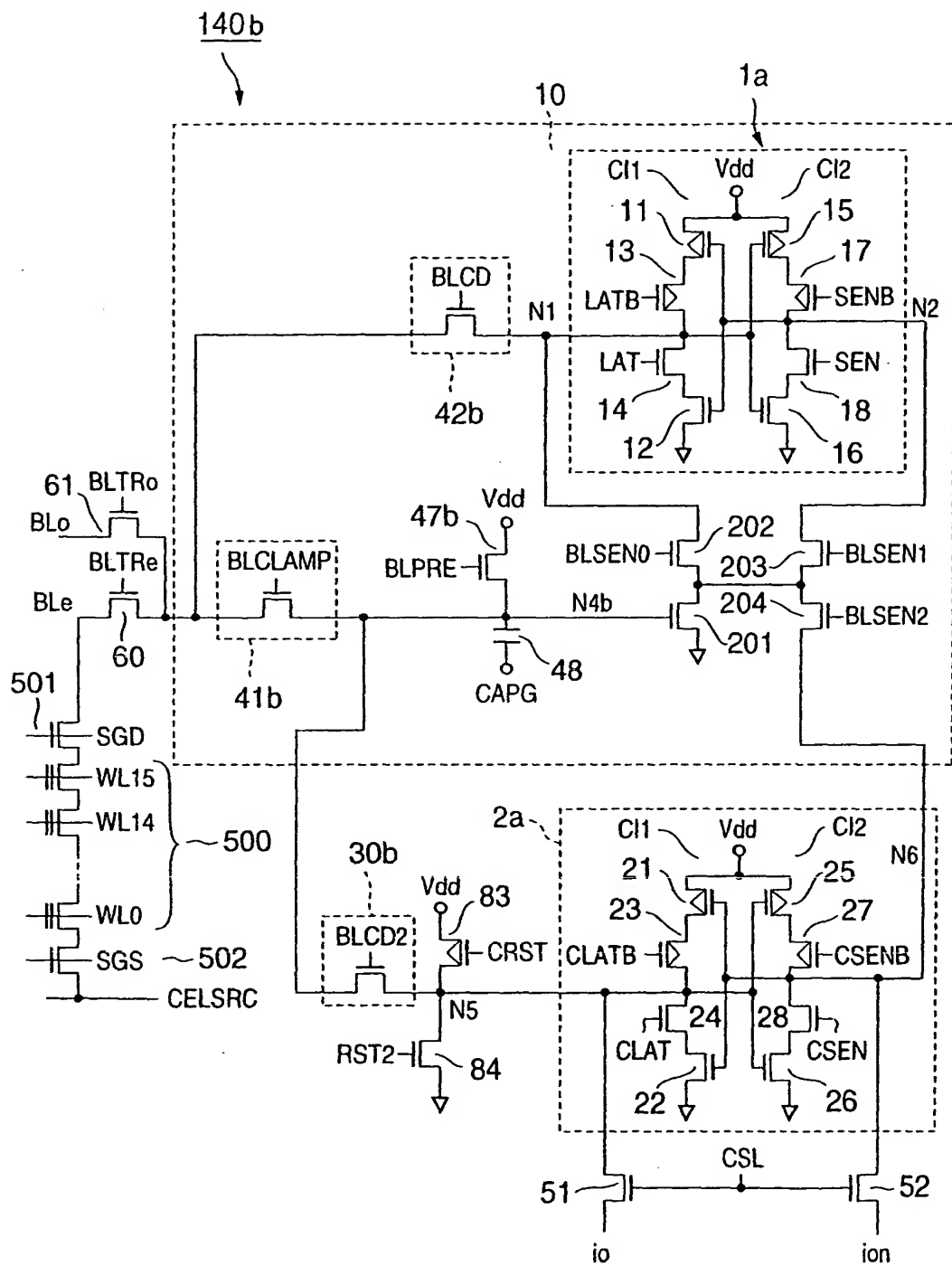


FIG.46

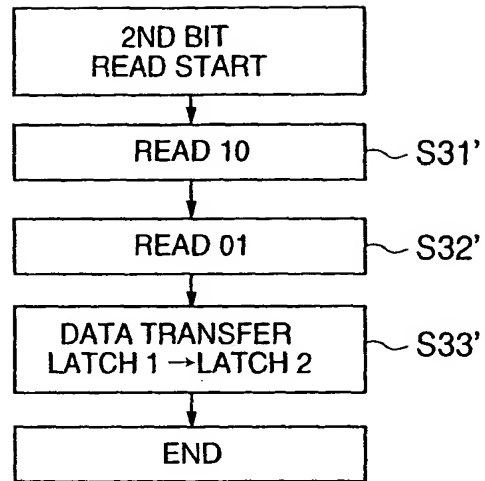


FIG.47A

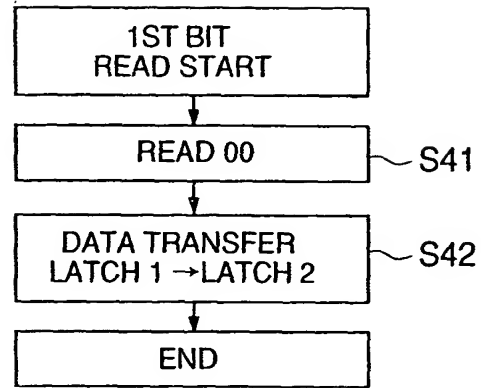


FIG.47B

	BL-POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
<PROGRAM START>						
DATA AFTER LOADED	—		—	H	L (LATCH 1a)	OV
IN PROGRAMMING	L		—	H	L	Vpgmi
<VERIFY "10">						
BL PRE- CHARGE	H		H	H	L	Vv10
RESET	H	NULL	H	H	L	Vv10
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vv10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L (FAIL) / H (PASS)	Vv10

FIG.48

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
<PROGRAM START>						
DATA AFTER LOADED	—		—	L	H (LATCH 1)	OV
IN PROGRAMMING	H		—	L	H	Vpgmi
<VERIFY "10">						
BL PRE- CHARGE	H		H	L	H	Vv10
RESET	H	NULL	H	L	H	Vv10
BL- POTENTIAL SENSE	L/H		H→ L/H	L	H	Vv10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	L→ L/H	H (PASS)	Vv10

FIG.49

	BL- POTENTIAL	LATCH CONTROL	N4b	N6	N5	SELECTED WL
BL PRE- CHARGE	H		H	H/L	L/H	Vr10
RESET	H	RST2	H	H/L →H	L/H→L	Vr10
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vr10
SENSED DATA RETRIEVAL	L/H	BLSEN2	L/H	H→ L/H	L ("1") / H ("0")	Vr10

FIG.50

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	H	L	L ("11" DATA)	OV
IN PROGRAMMING	L		—	H	L	L	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	L (FROM 5)		L	H	L	L	Vv00
RESET	L	NULL	L	H	L	L	Vv00
BL- POTENTIAL SENSE	L		L	H	L	L	Vv00
SENSED DATA RETRIEVAL	L	BLSEN1	L	H	L (FAIL)	L	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	H	L	L	Vv01
RESET	H	NULL	H	H	L	L	Vv01
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	L	Vv01
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L (FAIL) / H (PASS)	L	Vv01

FIG.51

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	H	L (LATCH 1a)	L ("10" DATA)	OV
IN PROGRAMMING	L		—	H	L	H	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	H (FROM 5)		H	H	L	H	Vv00
RESET	H	NULL	H	H	L	H	Vv00
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	H	Vv00
SENSED DATA RETRIEVAL	L/H	BLSEN1	L	H→ L/H	L→ L (FAIL) / H (PASS)	H	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	H (L)	L (H)	H	Vv01
RESET	H	NULL	H	H (L)	L (H)	H	Vv01
BL- POTENTIAL SENSE	※ L		※ H→ L	H (L)	L (H)	H	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	H (L)	L (H)	H	Vv01

FIG.52

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	L	H (LATCH 1)	L ("11" DATA)	OV
IN PROGRAMMING	L		—	L	H	L	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	L (FROM 5)		L	L	H	L	Vv00
RESET	L	NULL	L	L	H	L	Vv00
BL- POTENTIAL SENSE	L		L	L	H	L	Vv00
SENSED DATA RETRIEVAL	L	BLSEN1	L	L	H (PASS)	L	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	L	H	L	Vv01
RESET	H	NULL	H	L	H	L	Vv01
BL- POTENTIAL SENSE	※ L		※ H→ L	L	H	L	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	L	H (PASS)	L	Vv01

FIG.53

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	N5	SELECTED WL
<PROGRAM START>							
DATA AFTER LOADED	—		—	L	H (LATCH 1)	L ("10" DATA)	OV
IN PROGRAMMING	L		—	L	H	H	Vpgmi
<VERIFY "00">							
BL PRE- CHARGE	H (FROM 5)		H	L	H	H	Vv00
RESET	H	NULL	H	L	H	H	Vv00
BL- POTENTIAL SENSE	※ L		※ H→ L	L	H	H	Vv00
SENSED DATA RETRIEVAL	※ L	BLSEN1	L	L	H (PASS)	H	Vv00
<VERIFY "01">							
BL PRE- CHARGE	H		H	L	H	H	Vv01
RESET	H	NULL	H	L	H	H	Vv01
BL- POTENTIAL SENSE	※ L		※ H→ L	L	H	H	Vv01
SENSED DATA RETRIEVAL	※ L	BLSEN1	※ L	L	H (PASS)	H	Vv01

FIG.54

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	L/H	L/H	Vr00
RESET	H	BLSEN0	H	H/L →H	L/H→L	Vr00
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vr00
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L("1")/H("0")	Vr00

FIG.55

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	H/L	L/H	Vr10
RESET	H	BLSEN0	H	H/L →H	L/H→L	Vr10
BL- POTENTIAL SENSE	L/H		H→ L/H	H	L	Vr10
SENSED DATA RETRIEVAL	L/H	BLSEN1	L/H	H→ L/H	L→ L("1")/H("0")	Vr10

FIG.56

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	H	L ("1")	Vr01
RESET	H	NULL	H	H	L	Vr01
BL- POTENTIAL SENSE	※ L		※H →L	H	L	Vr01
SENSED DATA RETRIEVAL	※ L	BLSEN0	※ L	H	L ("1")	Vr01

FIG.57

	BL- POTENTIAL	LATCH CONTROL	N4b	N2	N1	SELECTED WL
BL PRE- CHARGE	H		H	L	H	Vr01
RESET	H	NULL	H	L	H	Vr01
BL- POTENTIAL SENSE	L/H		H→ L/H	L	H	Vr01
SENSED DATA RETRIEVAL	L/H	BLSEN0	L/H	L	H→ L("1")/H("0")	Vr01

FIG.58

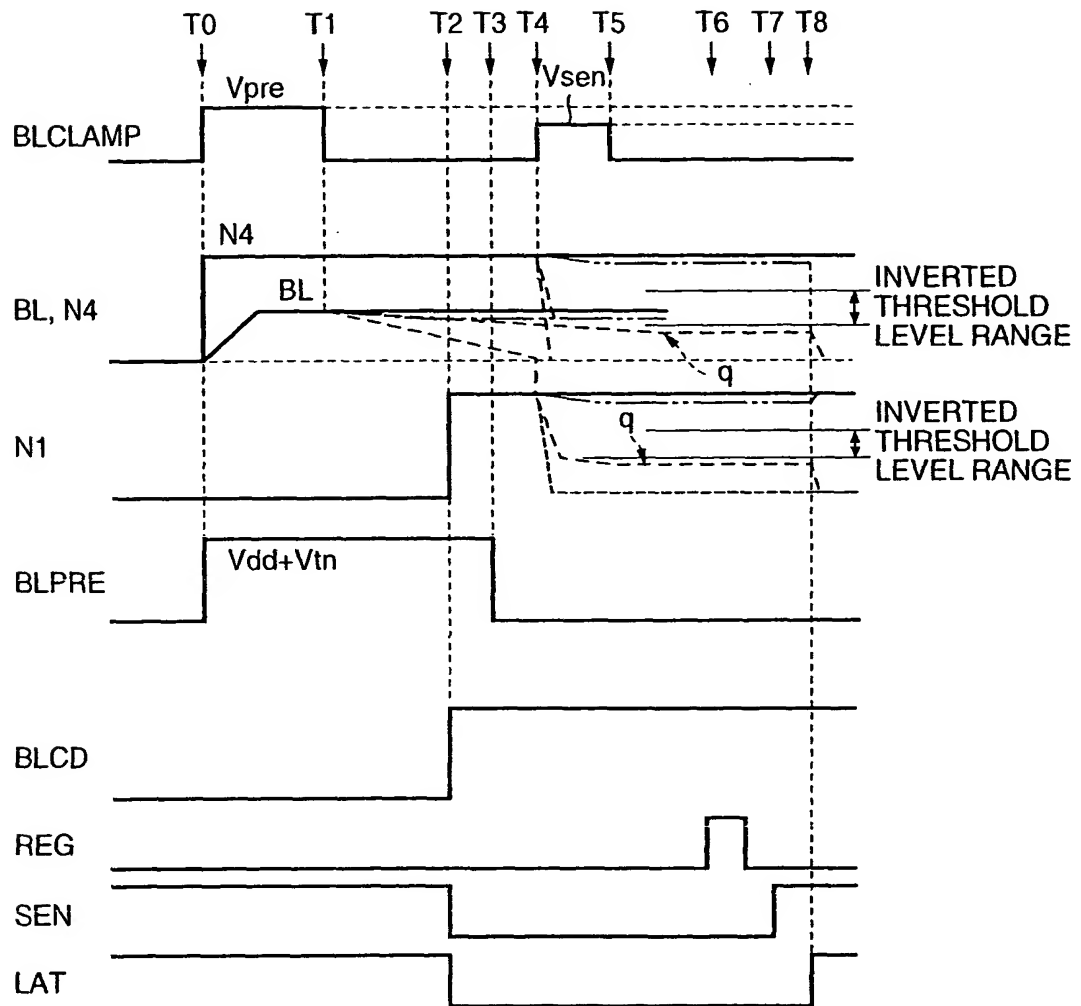


FIG.59

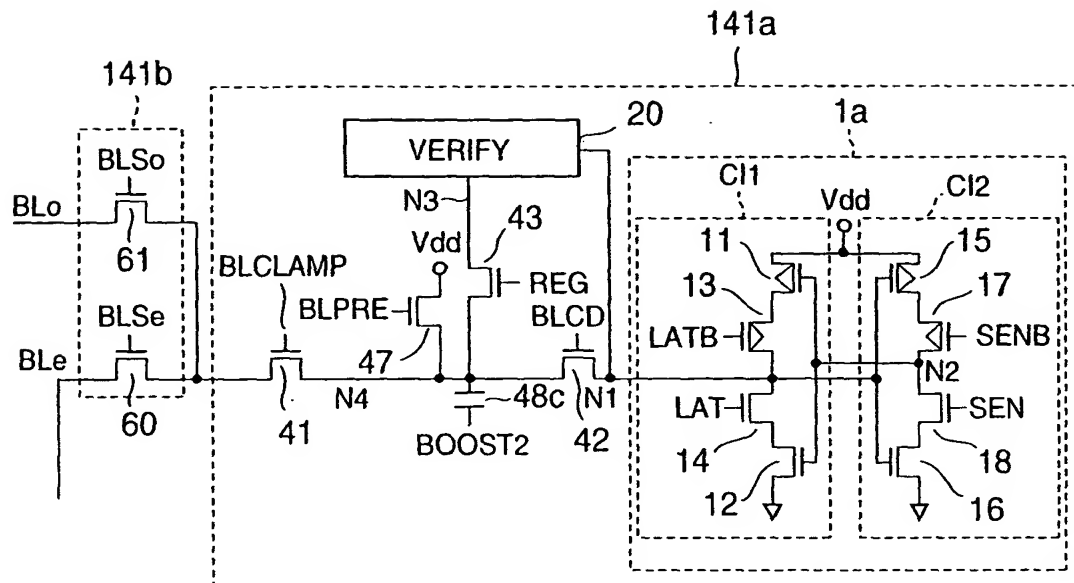


FIG.60

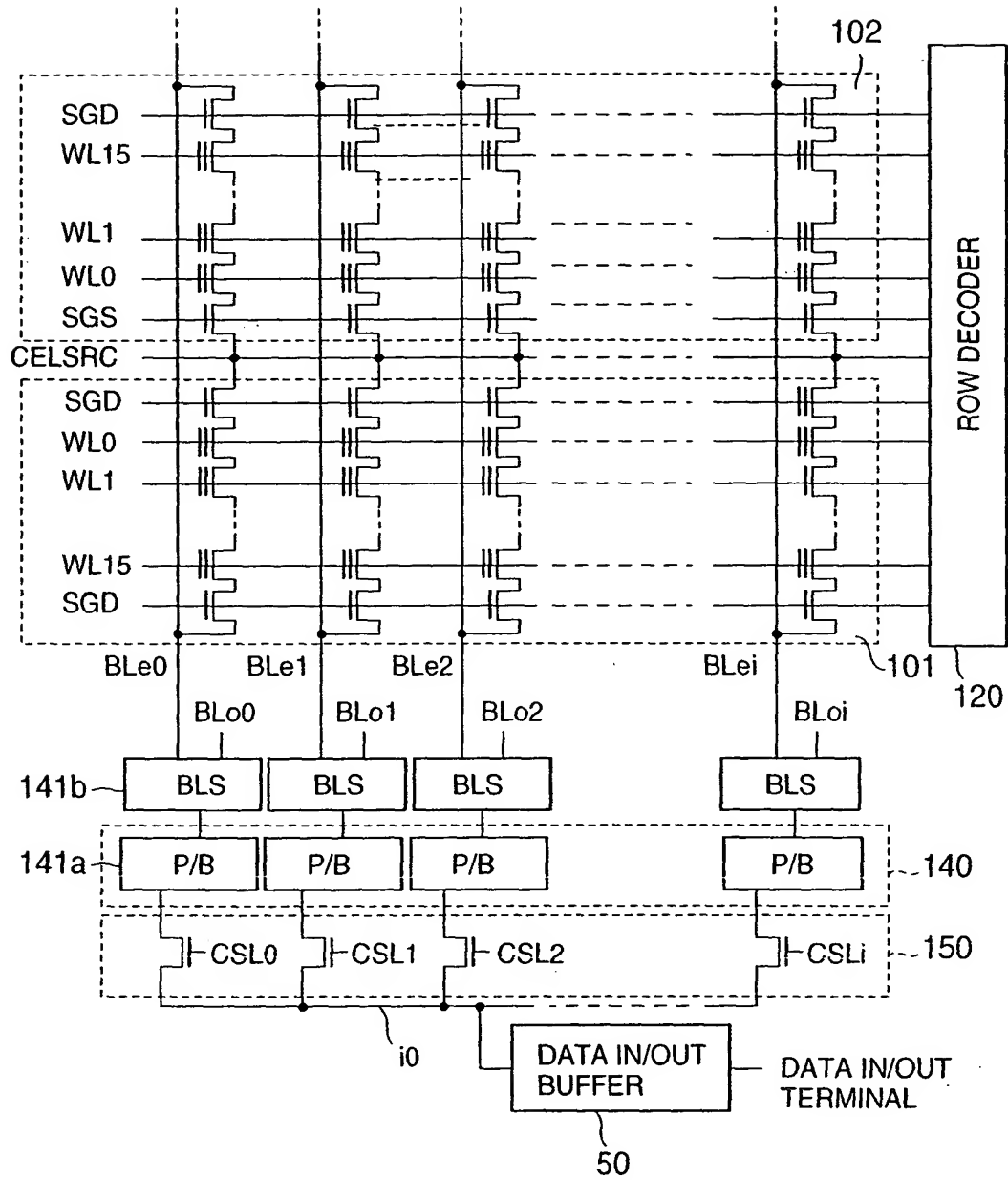


FIG.61

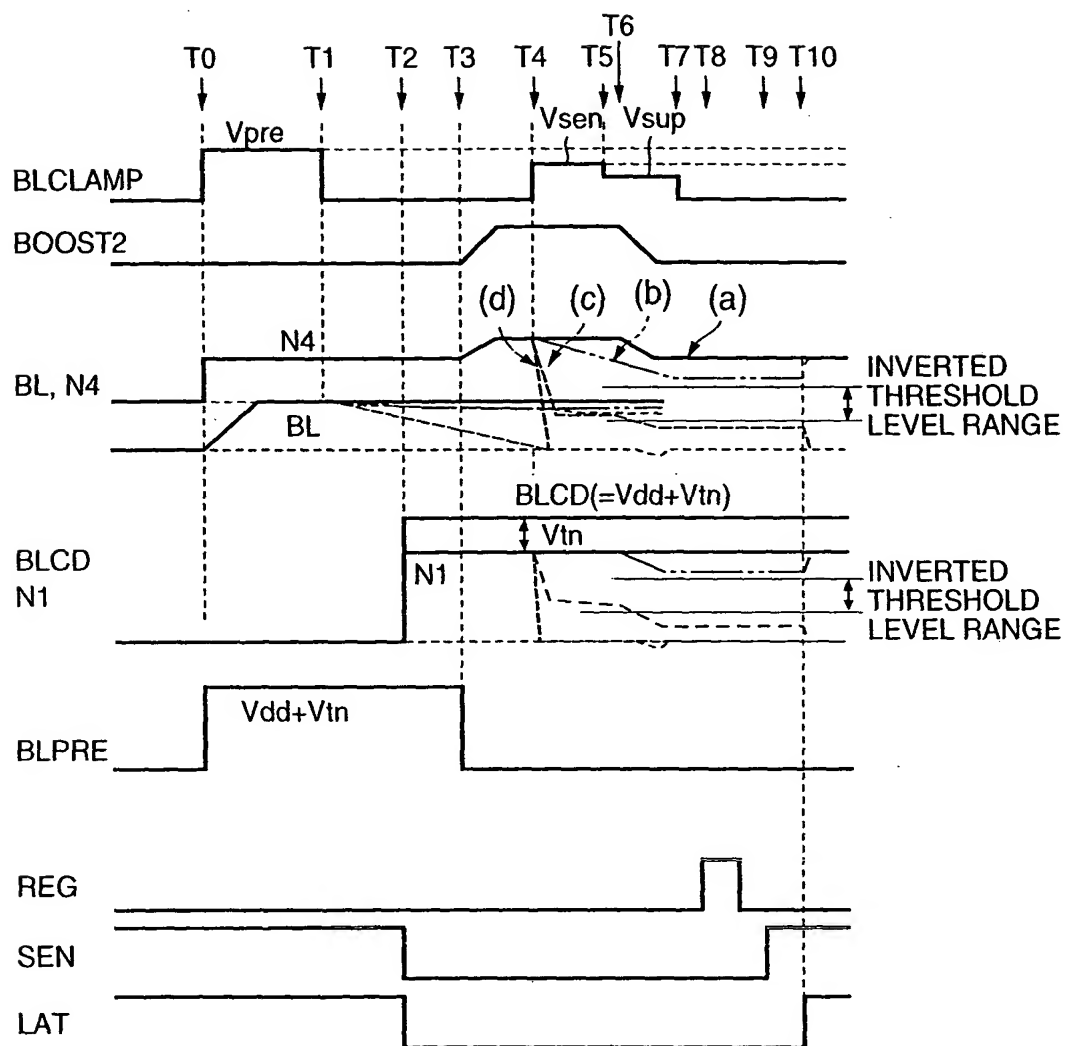


FIG.62

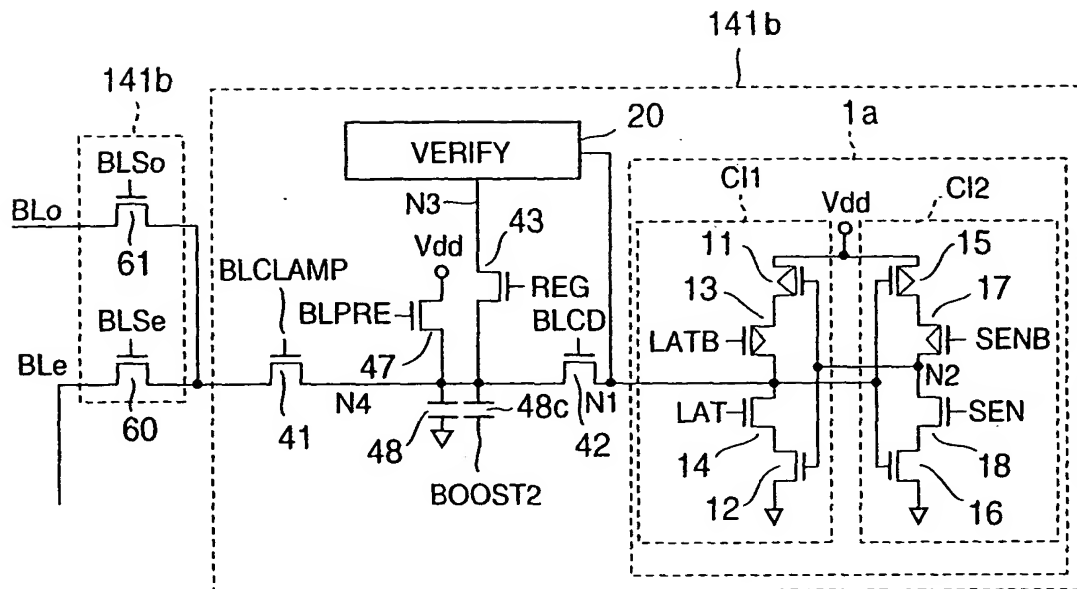


FIG.63

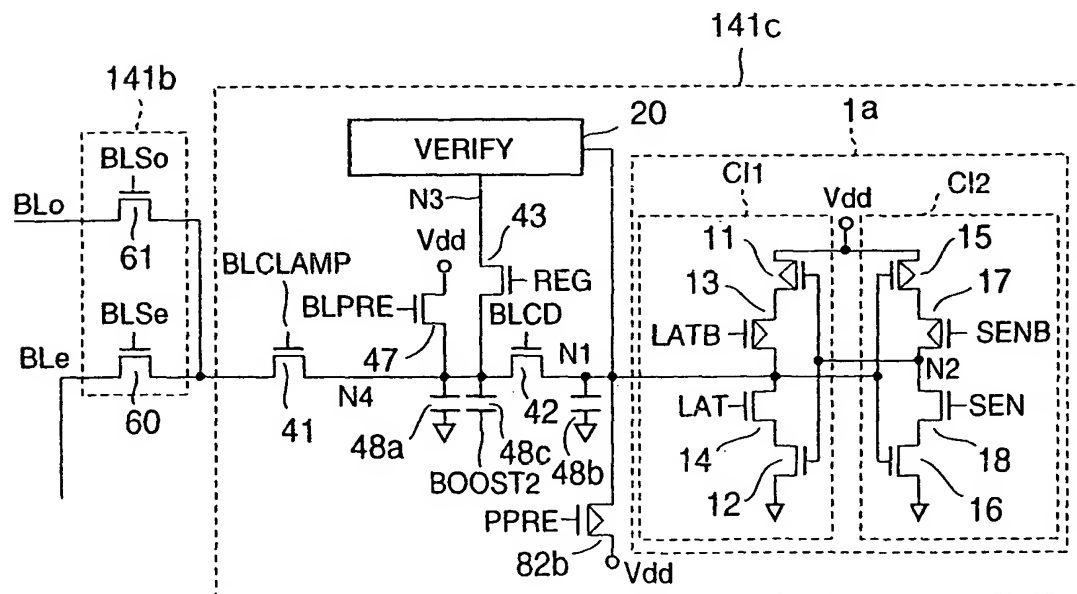


FIG.64

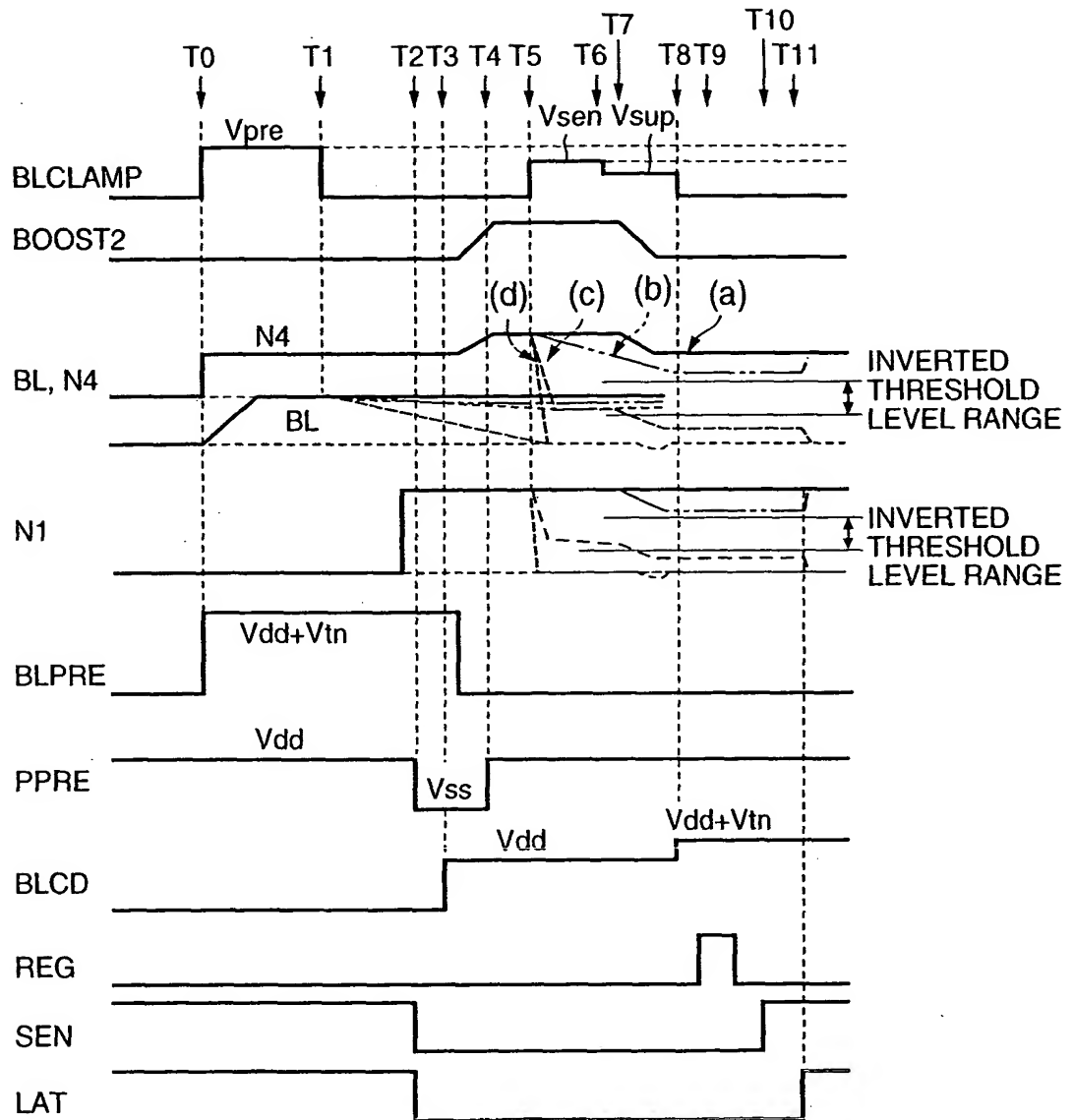


FIG.65

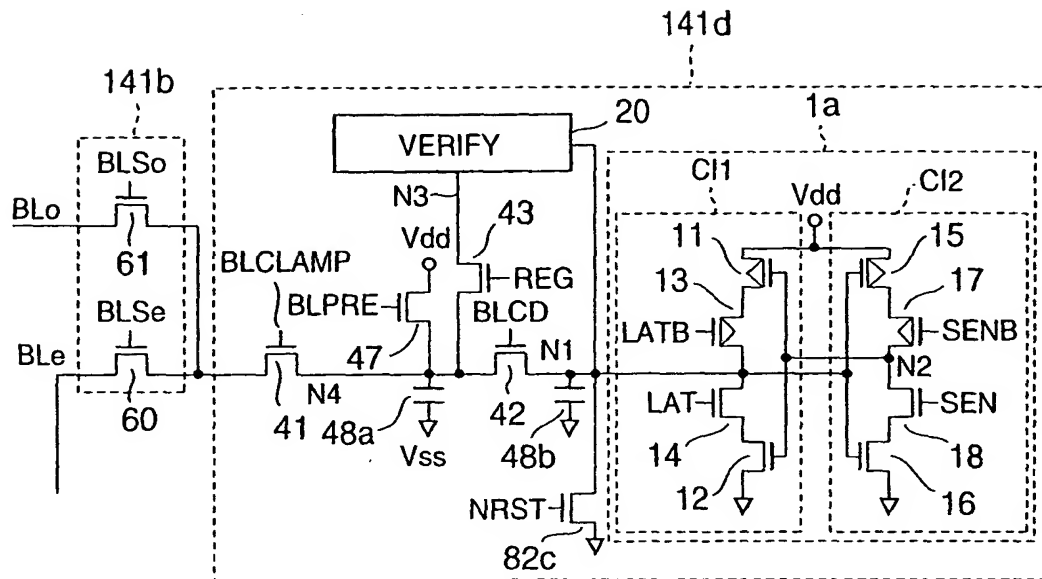


FIG.66

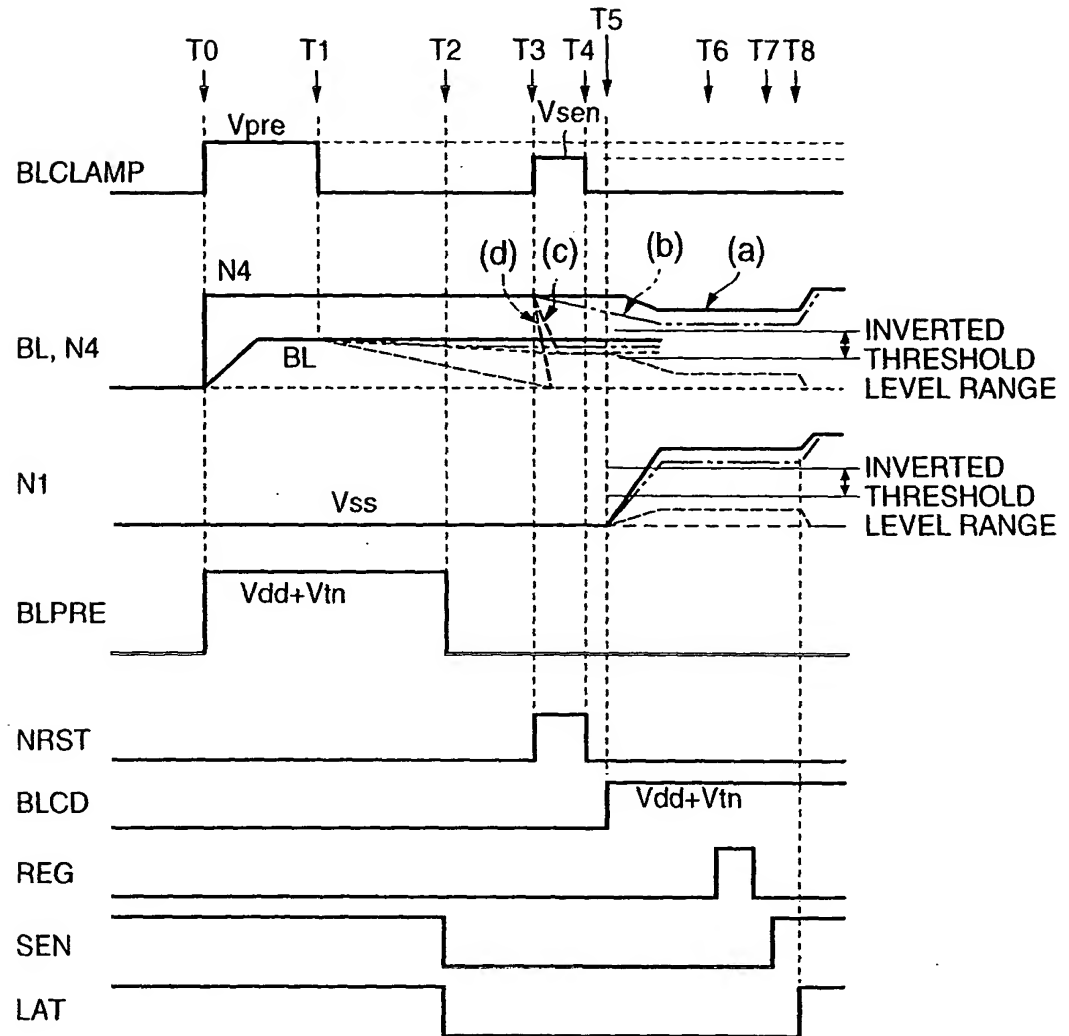


FIG.67

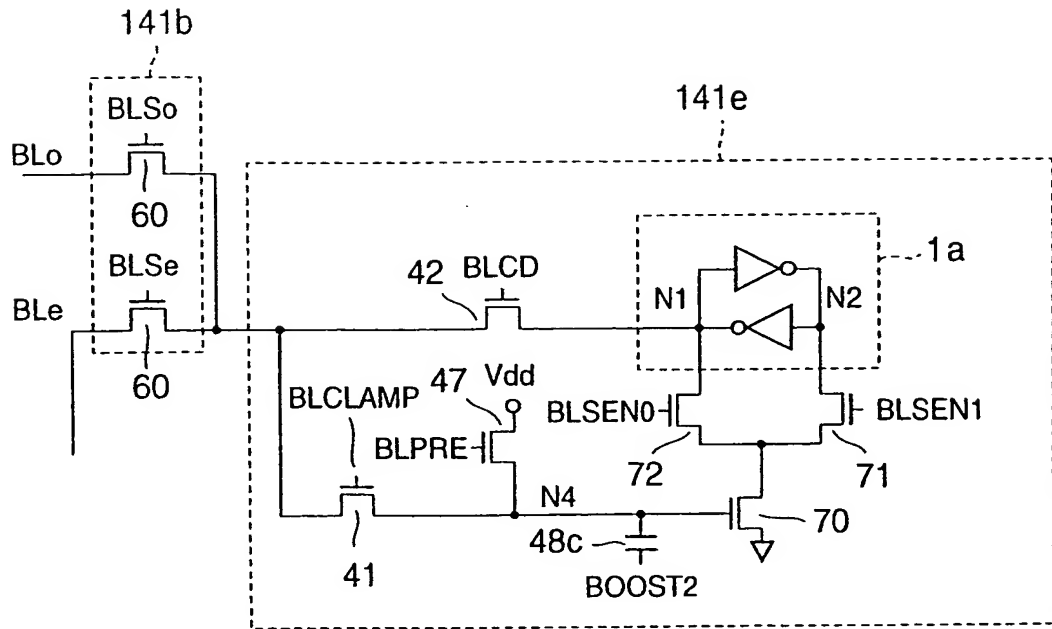


FIG.68

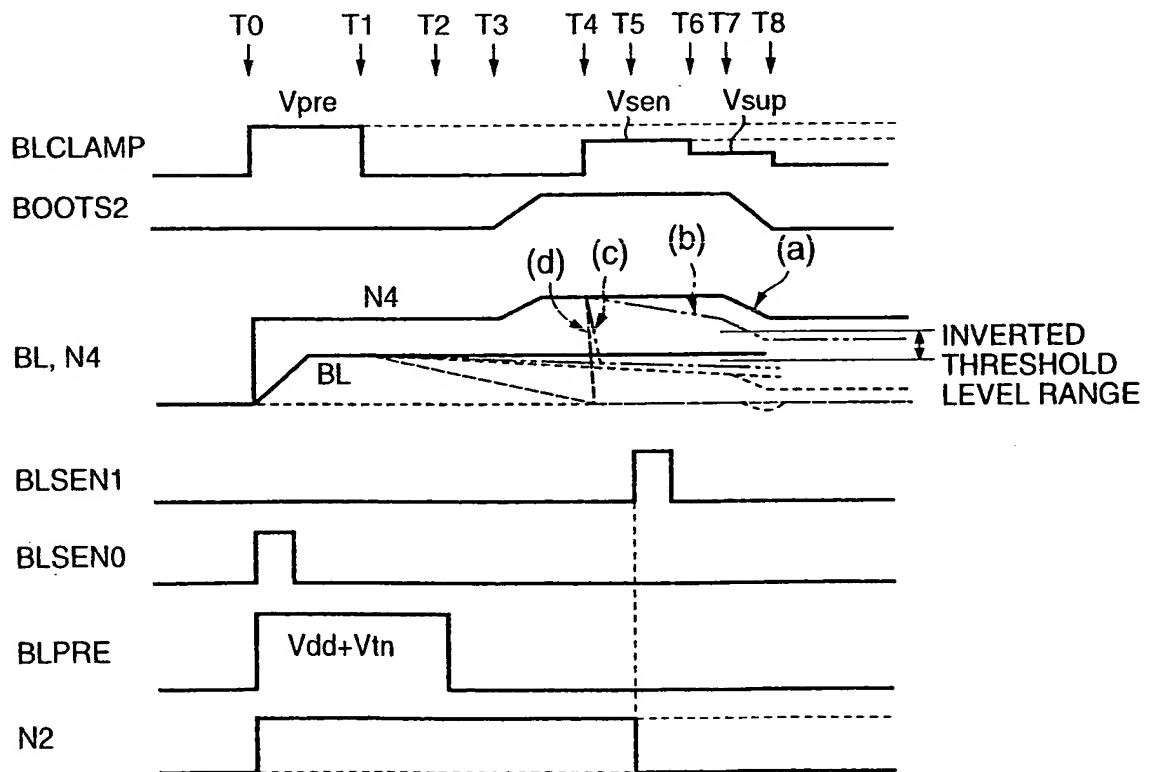


FIG.69

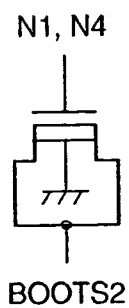


FIG.70A

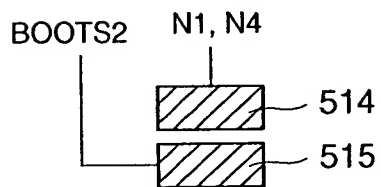


FIG.70B

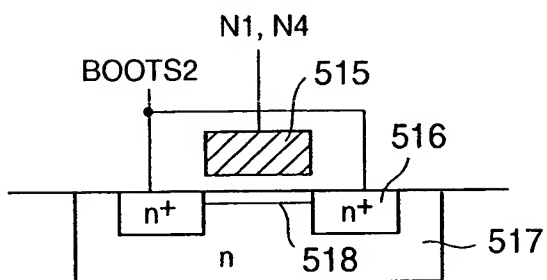


FIG.70C